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TEXTILE WORLD.

Page 61. #23190*
Apr. 11, 98

and
Industrial
Record.

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GUILD & LORD.
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620 ATLANTIC AVENUE,
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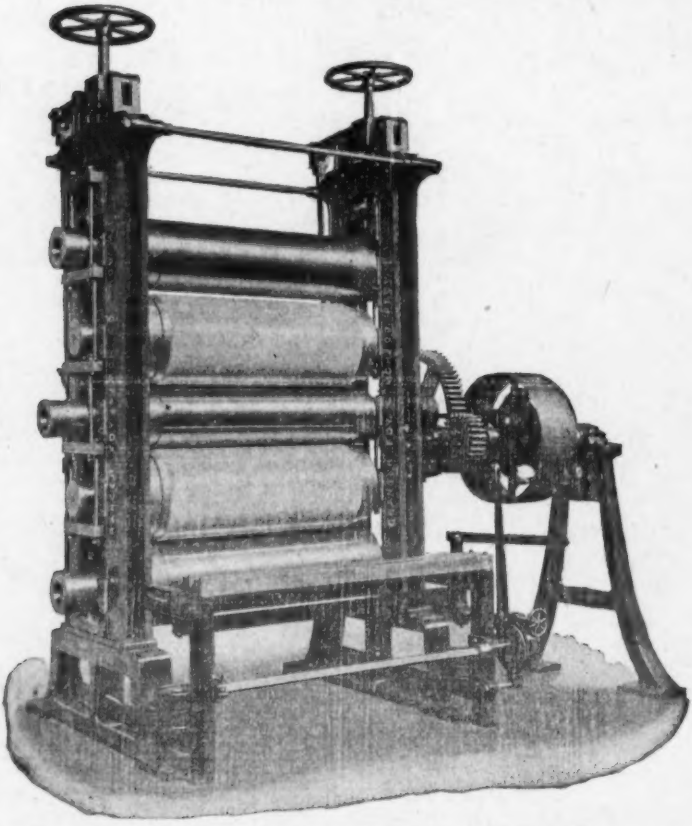
Bleaching, Dyeing, Drying,

And Finishing Machinery.



CALENDARS, MANGLES AND ROLLS.

TENTERING MACHINES,
MERCERIZING MACHINES.

Granger Foundry and Machine Co.

PROVIDENCE, R. I.

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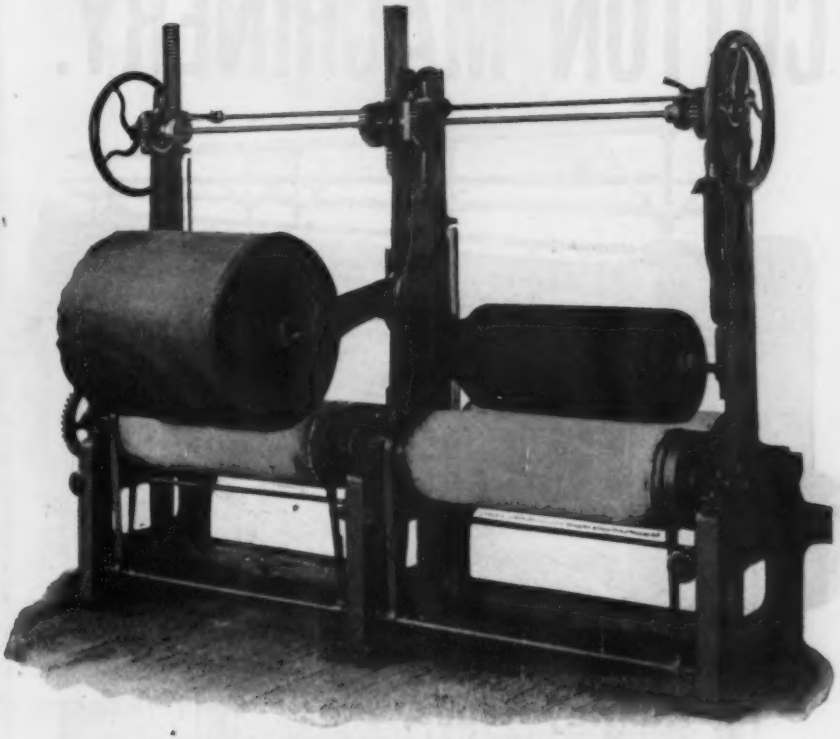
MACHINERY,

For Textile Fabrics



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W. P. SIMPSON, Patentee.

FOR USE IN CONNECTION WITH

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No stoppage or even "Slacking up" of the machine is necessary.

Cutting is done close to the seam, thus eliminating waste.

As creased ends are avoided at beginning and end of roll, no refinishing is necessary.

One man can attend two or more Winders, as the new roll is started automatically, and completed roll can be removed at convenience.

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PHILADELPHIA, PA.

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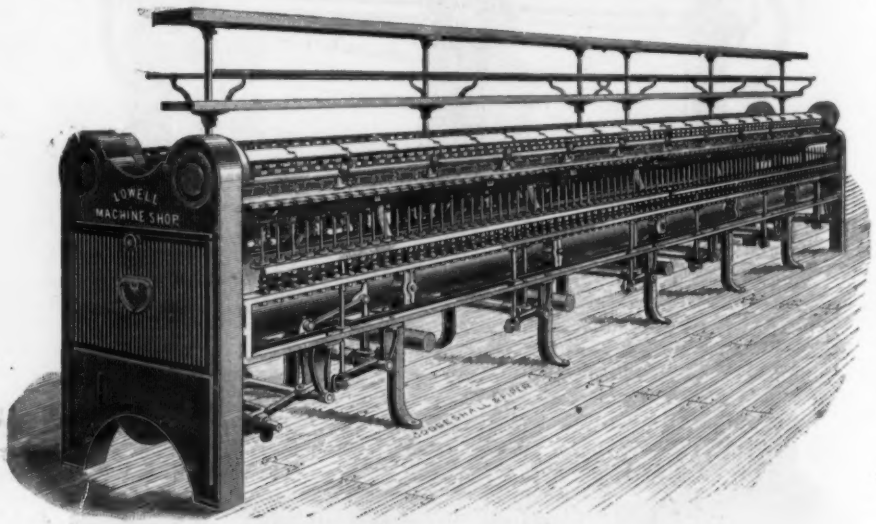
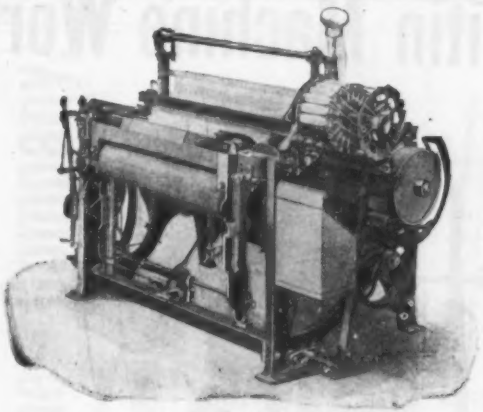


Revolving Flat Cards,
Railway Heads,
Drawing Frames,
Roving Frames,
Ring Spinning Frames,
Twisters, Spoolers,
Warpers, Slashers,
Looms.

WORSTED MACHINERY.



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Business is Improving.

MANY cotton mill managers will, therefore, conclude that they can possibly have a chance to run their old machinery at a profit instead of facing a daily loss.

SHOULD they fail to meet the increased demand by improving their facilities with **new machinery**, they will soon realize that the chance of a profit will bring the competition of **new mills** that will start with the latest and best equipment.

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Long Chain Quilling Machines,
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Looms,

Railway Heads,
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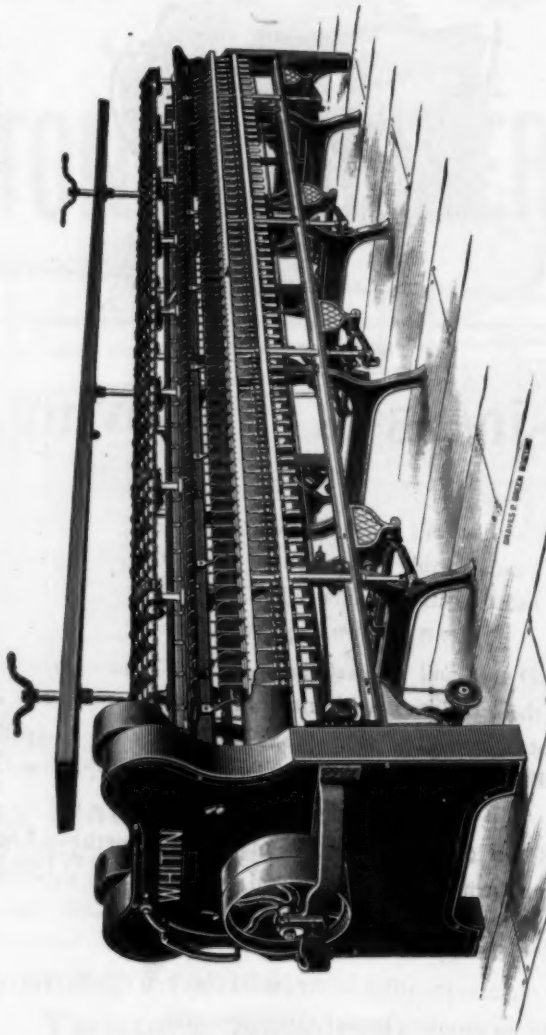
Reels,
Spoolers.



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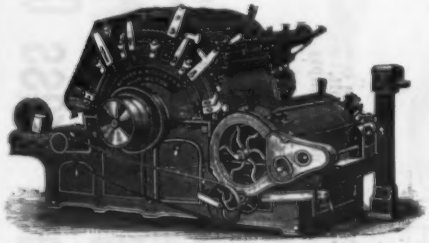

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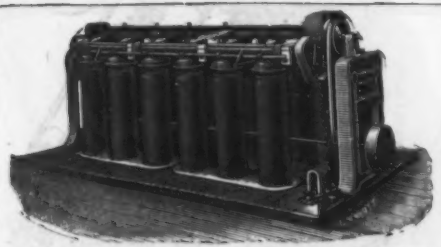

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All parts of above machines are made by special tools and are exact duplicates.

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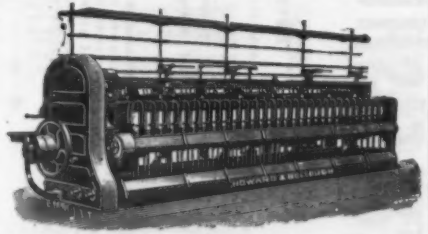

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Second to None

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Spinners of Worsted Yarns. Mixes and Fast Colors Specialties.
Boston Office, 570 Atlantic Avenue.

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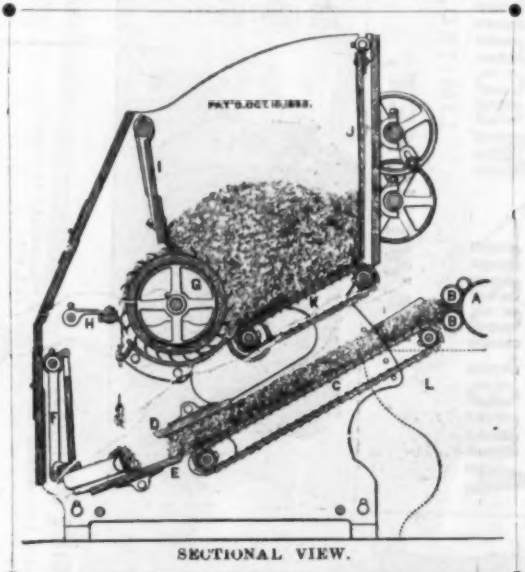
WOONSOCKET WORSTED MILLS,
EDWIN FARNELL, Agent.



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It is built in all sizes and guaranteed as represented.

STAR WORSTED COMPANY.
Worsted Yarns.
C. T. Crocker, Pres. C. B. Smith, Treas.

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Woonsocket Machine and Press Co.,

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(Second order.)

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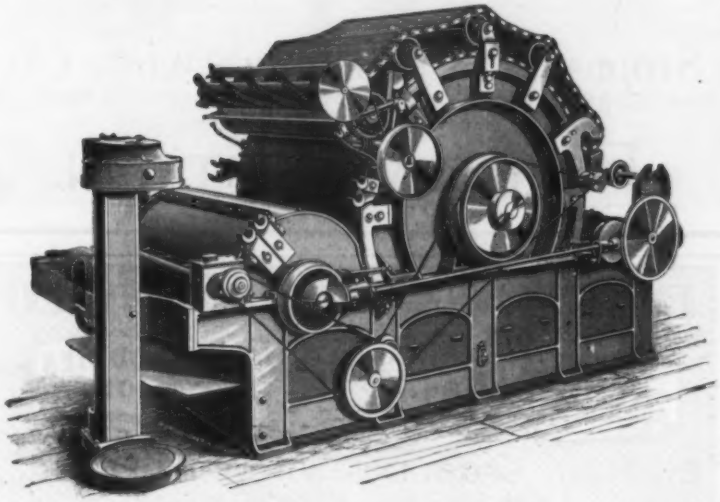

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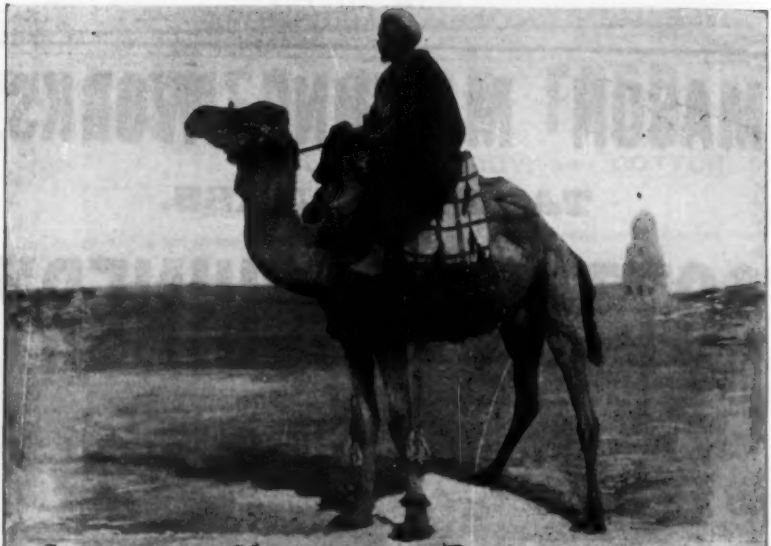

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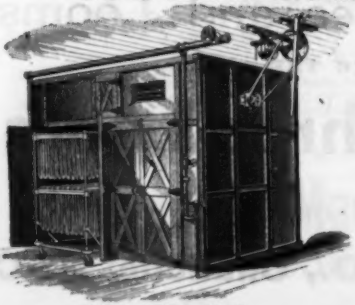

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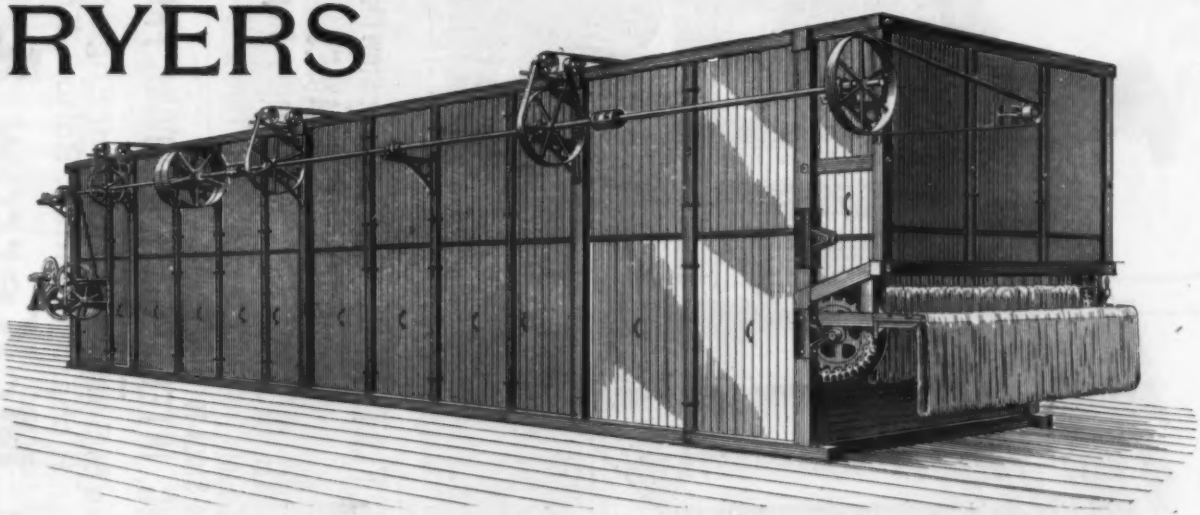

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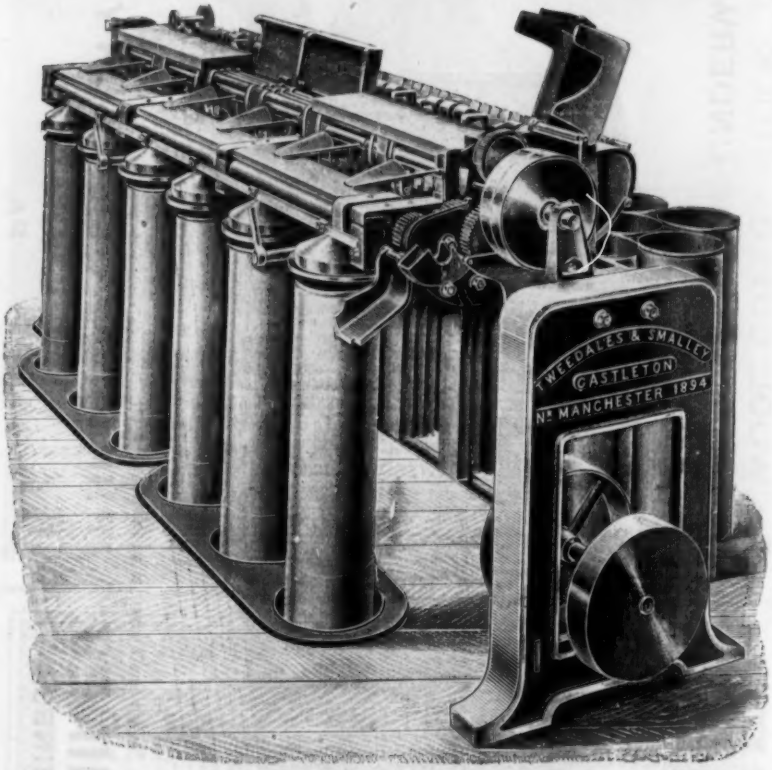

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I have recently perfected and am now placing on the market under a U. S. Patent, an attachment to a lapping machine, the use of which positively insures a smooth and even lap that will unwind from start to finish without sticking or splitting; thus insuring the continuous running of the carding machine without choking or splitting of the laps, and the consequent loss of time and production, besides improving the quality.

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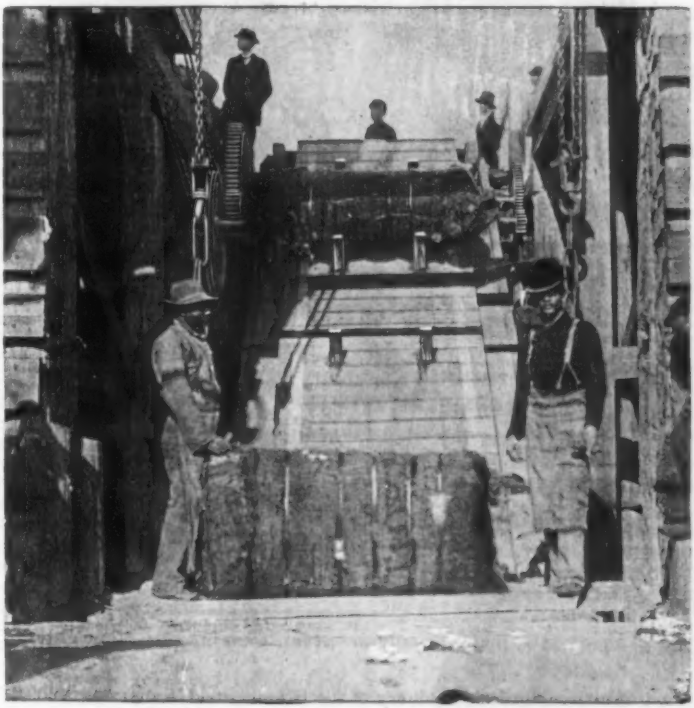

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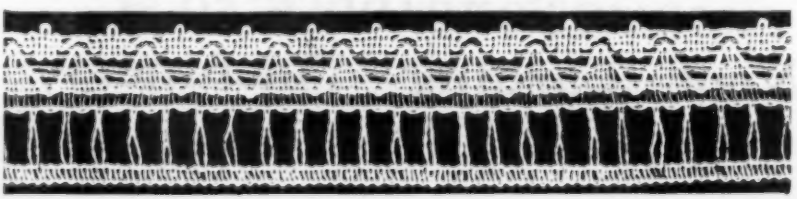

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The authorized Licensees under said Letters Patent and each of them, so far as the same relate to yarns and threads of every description, are:

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The American Mercerizing Company.

NEW YORK, November 13, 1899.

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Single and Diagonal Double Engines, Rubber, Brass, Iron and Copper Rolls. Expansion Pulleys, Friction Clutches, Shafting and Pulleys, Etc.

Textile World

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THE AMERICAN TEXTILE, THE DESIGNER AND WEAVER, WARP AND WEFT, THE WOOLEN MANUFACTURER

AND THE

BOSTON TEXTILE.

An Illustrated Monthly Magazine representing the Textile Industries of the United States.

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(400 pages with 19 maps)

Containing full information about all

COTTON MILLS, WOOLEN MILLS, KNITTING MILLS, SILK MILLS, DYE WORKS, PRINT WORKS, BLEACHERIES,

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Jobbers and Large Retailers,
Buyers from First Hands.

Special quarterly issues are published in January, April, July and October; one (January) being a statistical issue, and the others devoted especially to the cotton, knitting and woolen branches, respectively.

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George W. Gregory, in November, 1874, resigned his position as Principal Examiner U Patent Office to enter the firm.

Patents secured in the United States and all other countries. Reissues obtained. Interferences conducted. Suits brought and defended for infringement, and searches made as to the validity of patents. Prepared to give special and expert attention to cases involving knowledge of cotton, wool, leather and metal working machinery, including boots and shoes and electrical, chemical and metallurgical inventions and steam engineering Correspondence solicited. No charge for preliminary advice. Personal consultation best when possible.

HOPEDALE, Mass., January 9d, 1899.

Mr. George W. Gregory, of Crosby and Gregory, has taken out for us since January 1875, more than two hundred patents. GEO. DRAPER & SONS.

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List of Textile Patents.

Issued October 31, and November 7, 14 and 21, 1899.

Carding-Engine Fancy Roller. 635,927. Christian T. Goldberg, Neukirchen, Gy.

Cloth Measuring Device. 637,620. Jesse H. King, Escatawpa, Miss., assignor to Victor A. Lennep, same place.

Cotton Compress. 636,110. William Brady, Hearne, Texas.

Drawing Roll Clearer. 637,040. Cyrus E. Smith, Fall River, Mass.

Embroidering Machine. 637,458. Joseph A. Grobeli, New York City.

Fibres, Machine for Cleaning Vegetable. 636,086. Manuel A. Torre, Merida, Mex.

Knitting Machine. 636,187. Max Saldin, Manchester, N. H., assignor to himself and Henry Reichenbach, New York City.

Knitting Machine. 635,817. Bernard T. Steber, Utica, N. Y.

Knitting Machine Needle. 636,584. George F. Sturgess, Leicester, England.

Loom. 637,695. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair N. J.

Loom. 637,753. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

Loom. 637,486. George Poole, Lowell, Mass.

Loom. 637,195. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

Loom. 636,773. Wm. C. Edler and Frank Windle, Philadelphia, Pa.

Loom. 637,113. Henry I. Harriman, New York City.

Loom. 636,705. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

Loom. 636,704. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

Loom. 636,706. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

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E. G. SIGGERS, Patent Lawyer, Washington, D. C.

Loom. 636,635. John A. Clark and Joseph T. Cyr, Worcester, Mass., assignors to The Crompton & Knowles Loom Works, same place.

Loom. 636,228. Henry I. Harriman, New York City.

Loom Batting. Weaving. 635,805. John Poyser, Wirksworth, England.

Loom, Circular. 636,800. Carl Herold and Richard Richards, Brunn, Austria-Hungary.

Loom Filling Supplying Mechanism. 635,759. Abram D. Emery, Taunton, Mass.

Loom for Weaving Double Pile Fabrics. 636,533. John Killars, Stonington, Ct.

Loom Knife-Sled Motion. 636,263. John Killars, Stonington, Ct.

Loom, Lappet. 637,129. Georges Kinsbourg, Remiremont, France.

Loom, Pile Fabric. 635,897. George Poole, Thompsonville, Conn.

Loom, Ribbon. 636,979. Alfred Gartner, Paterson, N. J., assignor to Schaum & Uhlinger, Philadelphia, Pa.

Loom Shedding Mechanism. 636,493. Richard H. Cook, Fall River, Mass.

Loom Stop-Motion, Electrical. 637,235. Joseph Coldwell and Christopher G. Gildard, Fall River, Mass.

Loom Shuttle. 636,207. John L. Kinney, Burlington, N. C., assignor to Edwin C. Holt, Stephen I. Moore, and Henry C. Fowler, same place.

Loom Shuttle. 636,227. Stephen M. Hamblin and Wm. H. Goldsmith, Central Falls, R. I.

Loom Stop Motion Mechanism. 637,412. George Poole, Thompsonville, Conn.

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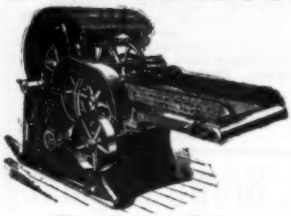

WOOL PICKER, No. 1.

A WORD ABOUT OUR WOOL PICKER.

The Picker is too often given small consideration. Any old thing that will tear the stock up, seems to answer for many mills. It's a great mistake. Bad work here means trouble all along the line. Our Picker is built to do good work and **it does it.**

This machine is provided with steel toothed cock spur feed roller, driven by compound gearing.

The teeth in the cylinder are made of best steel and are securely fastened in their places.

The grate under the cylinder is made of round bars geared together so that they revolve, preventing the grate from choking.

The gears are covered and the machine provided with adjusting screws to take up the wear.

There is a door at the side for the convenient removal of the dirt and to provide draught.

The Picker discharges from the back underneath.

The 40-inch Picker is driven by two belts from a countershaft which accompanies the machine.

We also make a light pattern 18-inch Picker for small mills.

Send for our illustrated catalogue telling all about our complete line of woolen

CARDING, SPINNING AND WEAVING MACHINERY.

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Philadelphia Office, 428-430 Bourse.

Loom Warp Stop Motion. 636,503. Wm. F. Draper, Hopedale, Mass., assignor to Draper Company, same place and Portland, Me.

Loom Warp Stop Motion. 637,234. Joseph Coldwell and Christopher G. Gildard, Fall River, Mass.

Loom Warp Stop Motion Mechanism. 637,675. Samuel Sewall, Tewksbury, Mass., assignor to the Sewall Steel Heddle Company, same place.

Loom Weft Supply Mechanism. 636,707. Wm. H. Baker, Central Falls, R. I., and Frederic E. Kip, Montclair, N. J.

Napping Machine. 636,402. David Gessner, Worcester, Mass.

Rubbing Apron for Worsted Drawing Machines. 637,543. Alfred Wolstenholme, Philadelphia, Pa.

Sliver Receiving Can for Cotton or Other Machines. 637,436. Joseph T. Ward and John B. Curtis, Chicopee Falls, Mass.

Spinning and Twisting Machine Stop Motion. 636,404. Fred Haggas, Sr., Providence, R. I.

Textile Machinery, Lifting-Roll Holder for. 31,865. John T. Meats and Wm. Ashworth, Taunton, Mass., assignors to the Mason Machine Works, same place.

Warp-Beaming Tension-Governor, Automatic. 11,791. (Re-issue). George Brown and Emil Dick, Auburn, Me.

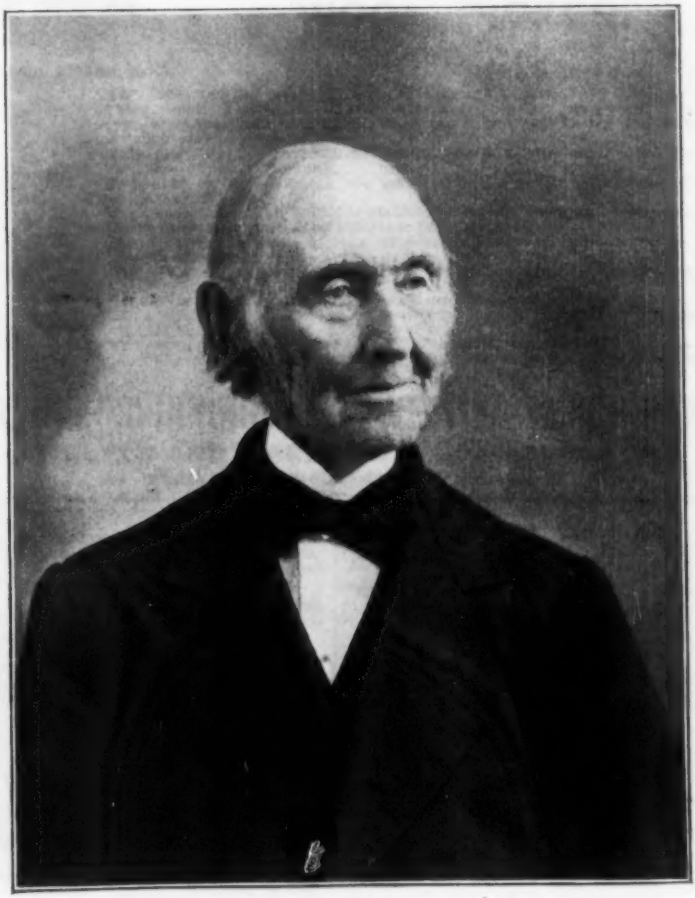
Weaving Apparatus, Circular. 637,336. Charles G. Hill, Arnot Hill and Rudolph Weiss, Nottingham, England.

Weaver's Pick-out and Scratch-up Comb. 636,395. James A. Carr, Fall River, Mass.

Winding Machine, Thread. 637,438. Fred A. Whitmore, Hopedale, Mass., assignor to the Draper Company, same place and Portland, Me.

Wool-Cleaning Machine. 636,714. James Brandy, Lawrence, Mass., assignor of one-half to Roswell C. Taylor, same place.

—To show the advance in the average price of commodities, the "London Economist" has recently published its "index numbers," showing that prices have risen about eleven per cent., on the average, since the first of the year. One of the leading factors in the advance has been the higher price of cotton and its products. Food products have responded to the general movement, and an advance in the price of metal has also been considerable. "The difficulty," says the Economist, "of obtaining tonnage, and the high freight rates resulting from the large number of ships engaged in the transport of troops to South Africa, has more or less affected the price of all commodities imported into England. One of the articles so affected is timber."



JAMES M. VARNUM.

TEXTILE WORLD.

Vol. XVII. DECEMBER, 1899. No. 6.

JAMES M. VARNUM.

Capt. James M. Varnum died at his home, "Brook Farm," Goffstown, N. H., August 23, 1899. Had he lived until November 25th, he would have been ninety years old. Until last year he was enjoying remarkably good health. The portrait of him on the opposite page was taken at the age of eighty-eight.

Captain Varnum came of good old Revolutionary stock, and his ancestors occupied a prominent place in the early history of the nation. He was reared amid influences and associations patriotic, loyal, and inspiring in character, and in his long and upright life stood out as a fitting representative of a race famous for their long and well-spent lives. He was a Jeffersonian Democrat, — democratic in thought and act,—cast his first presidential vote for Andrew Jackson, and voted his political faith at each presidential election since.

He was born in Dracut, Mass., son of Col. Daniel Varnum. Hon. Joseph Bradley Varnum, for many years speaker in the national House of Representatives, and afterwards occupying the position of president of the national Senate, was his uncle.

He obtained an excellent education at Philips Academy, Andover, Mass. His certificate of admission was as follows:

Philips Academy.—English Department.—Mr. James M. Varnum is admitted a member for the term commencing Sept. 7. Tuition, $250. Paid. S. R. Hall, Principal. Andover, Nov. 7, 1831.

He was at the academy for four years, and on leaving this institution he entered the employment of the Merrimack Print Works, Lowell, Mass., of which Robert Prince was agent and Reuben Hutchinson was overseer. Here he thoroughly learned the trade of machine printer. In the early forties he was invited to take charge of the print works of the Hamilton Corporation, Lowell, and managed their printing until 1846, when he went to Manchester, N. H., and took charge of the Manchester Print Works, which position he held until the burning of the printery mill in 1852, when he built a large bleachery on one of the islands just below the Amoskeag falls. During the civil war this was destroyed by fire. At the solicitation of Agent Straw the captain entered the employ of the Amoskeag corporation, taking charge of the bleachery. This position he held about fifteen years, when he quit active mechanical life, and purchased a charming home about four miles from Manchester on the Goffstown road, named it "Brook Farm," and here for many years has welcomed his friends.

While living in Lowell Mr. Varnum was active in the organization of a military company known as the "Lowell Mechanic Phalanx," and was elected its captain September 11, 1840. He was re-elected to the command of the company three successive terms thereafter, and during his residence in Lowell was, for twenty-one years, a leading and active member of the organization.

Samuel Webber, well known to nearly all textile manufacturers in New England, sends us a letter with a few notes of reminiscences of Mr. Varnum, in which he says: "I remember him very well, as a straightforward, good-hearted man, and very

much interested in the old Mechanic Phalanx, of which he was captain."

In the passage of the Massachusetts fifth regiment through Baltimore in 1861, this same Mechanic Phalanx furnished the first Massachusetts martyr sacrificed to the nation's defence. The company which Captain Varnum at the age of sixteen labored so successfully to organize, exists today an honor to the city of Lowell and the Commonwealth of Massachusetts,—a glory to each name borne upon its roll, especially its earlier membership.

He was a member of the Episcopal church, and for many years a vestryman of Grace church, Manchester. He was a trustee in the Merrimack River Savings Bank, Manchester, forty or more years.

He married Sarah A. Durgin, who survives him.

Of immediate relatives there survive him four nieces, Mrs. Georgette A. Chamberlain of Washington, D. C.; Mrs. Augusta Foran of Boston, Mrs. Ellen Thissell Boynton, Pasadena, California, and Mrs. Jane Thissell Elliott, Maldon, Mass.; three nephews, Daniel, Wallace, and Nelson Thissell, Lowell.

Mr. Varnum was made a Mason in Lafayette Lodge in 1857, and advanced through Mount Horeb Chapter and Adoniram Council to Trinity Commandery, where he became a Knight Templar in 1869. In point of years he was the oldest member of the local commandery, and possibly the oldest one in the state.

ANGORA GOATS.

We have had a great many inquiries from parties from different parts of the New England and Middle States and elsewhere, for information concerning angora goat husbandry. These inquiries have become so numerous that it clearly indicates to us an intense interest among many people, in these animals, for use in the rough pastures of hilly lands, covered more or less with undesirable growths of wild shrubbery, etc. On account of this apparently general interest, we shall publish in an early issue a lengthy illustrated article concerning these animals, which we trust will be of practical utility to those who wish to engage in their raising and keeping. From what information we have, we should say that a number of parties in the northern latitude of this country will soon make practical attempts for stocking their farms or lands with this breed of goats. As an example of what is being done, the Simpson Stock Farms at Saxonville, Mass., have recently been leased for a term of ten years, with a partial purpose of employing these goats as an economical feature to certain agricultural plans. Two carloads of these animals, one from Iowa and one from Texas, are on the way to this farm. The lessee writes us that he intends to go into the goat business on a large scale, and that his experience in this husbandry would read very much like a fairy tale, if told.

—Some of the new processes of baling cotton are being utilized, tentatively, for baling wool, but with no pronounced success as yet. Scoured wool, undoubtedly, can be baled to fair advantage in this way, but the attempt of getting the immense pressure on such wool of forty pounds to the cubic foot, as is talked about, is carrying it too far. The dry Asiatic wool may be baled this way, but the greasy wools of Australia and other countries could not be without damaging the wool almost irreparably. Greasy wools should not be subjected to very severe pressure, and those shrinking on the average of fifty per cent. should not be compressed into a density of more than ten pounds to the cubic foot.

—New England, in which the wool manufacture by the factory methods was first introduced, remains, as it has always been, the chief seat of the industry in the United States, producing, so far as our clothing alone is concerned, as large a share of it as all the rest of the Union combined.

EXPORTS OF COTTON GOODS.

Senator William P. Frye spoke quite recently in Boston, before the Beacon Society, on the commerce of the United States, and alluded to the interest of this country in foreign markets, which is becoming greater and greater as the years go by, and to the prospect that we shall soon have more than 100,000,000 people, producing more than can be consumed, and which will require foreign outlets, more than can be found in Europe. He declared that we must expect to meet the fiercest kind of competition in all branches of industry. He then raised the question: where are we going to find a market? "In the Orient? Nowhere else. There are 700,000,000 or 800,000,000 people there. They imported last year $1,500,000,000 worth of just such things as we have to sell. There is an advancing civilization in the Orient, which ought to double their importation in a few years, for civilization always doubles the necessities of a people. Now, what can we do to reach that Orient?" He said: "Build a canal across the Isthmus of Panama." He then asked the question: "Does any intelligent man fail to see that, with the shortening of the distance and the lowering of the freight rates, we can certainly obtain a field there and a participation in the trade of these countries?"

What Senator Frye says is true in substance, that we shall be obliged to look to foreign countries for customers for our agricultural and manufactured products, with greater assiduity than heretofore; though it is equally true that for a great many years to come our best market will be that found within our own national limits. Great changes have taken place within the last few years, and especially so since we have come into possession of far distant territories, bringing us more within the quickening influence of the foreign trade of competing nations.

While it may be true that our most rapid progress for the disposition of our textile manufactures, and others, will be among Asiatic nations, the time will soon be upon us when a substantial and increasing trade will be developed with the people south of us. At present, as Senator Frye remarks, the Orient offers the greatest inducement for the development of foreign trade, to meet the ever growing demands of millions of people that are being brought into contact with the wants of civilization.

That the United States government should undertake the financial responsibility of carrying out a scheme for the construction of a canal across the Isthmus of Panama, or some other contiguous locality, is more than apparent, as a commercial undertaking of the greatest importance to our commercial and political development. With a water-way across the Isthmus of Panama, the distance from New York to Manila will be reduced from 11,550 to 9800 miles, a saving in distance of 1750 miles.

The fact is becoming recognized that the great competition for trade among nations will be that between the United States and all the European nations combined, and the chief sphere of activity for the next quarter of a century, at least, will be in the Orient, when the commercial advantages to us of our new Pacific Ocean possessions will be seen and appreciated. What is wanted now, by us, is persistency, and a wise and well formulated policy on the part of our government, insisting upon all the privileges which any other nation possesses. The importance of such a course has already been referred to in these columns, more particularly in the recent action, so far as textiles are concerned, of Southern manufacturers in petitioning the president to insist upon an "open door" policy, which we have been inclined to think Russia and Germany, as well as France, have not looked upon with favor while extending their political and trade influences in China. The action of our government in requesting these nations to define their policy in

this respect will undoubtedly secure assurances that will give the United States all of the privileges of the most favored nation.

The demand for our manufactures among the Asiatic communities will increase, as above intimated, with the extension of civilization, which will be brought about as European and American methods of commercial intercourse come into closer contact with those of these people. These trade methods will follow the advance of railways, which are now being planned, from the principal seaports of China, for instance, to the central provinces of the Celestial Empire. Concessions to construct a railroad from Canton to Chang-tu, a distance of 800 miles, have already been granted to an Anglo-Chinese company. This railroad, it is understood, will connect two of the greatest emporiums of trade in the Chinese Empire, and will be the means of distributing a large quantity of merchandise throughout the interior domains of that country, where traffic is now conducted with the rudest implements of transportation, costing, according to a certain estimate on the part of one who has traveled therein, in the neighborhood of 15 to 20 cents a ton per mile. The cost of transportation in the United States, by our railway facilities, is about ⅝ of a cent per ton per mile.

The United States is increasing its exports of domestic manufactures not only in actual amount, but also in proportional amount with the total exports of domestic merchandise. The exports of manufactures, in 1859-60, amounted to 12.76 per cent. of the total value of the exports of merchandise, while, in 1898-99, the percentage was 28.13, which had never before been equaled. Our exports of manufactures in October last exceeded that of any previous month, with the exception of two, in the history of the country. The total exports of manufactures for the first ten months of the current year were $311,369,173, in value, which, at this rate, would amount for the present year to $373,643,007, far exceeding that of any previous year.

To show the rapid strides that have been made, of late, in our exports of manufactured articles, it is enough to state that for the first ten months of the current year the value of these was almost one-half of the value of our exports of agricultural products, which is without precedent. Though the chief part of this increase consisted of manufactures of iron and steel, our textile manufactures, especially cotton cloths, contributed largely towards it. Taking from the list of exports such items as refined mineral oil and copper ingots, there is no one item of export so large as that of cotton cloth, amounting to $16,415,457, the next below being agricultural implements, amounting to $12,634,649.

According to the returns of the Imperial Maritime Customs showing the imports of cotton piece goods at Shanghai, it appears that for the quarter ending the 30th of September last, there were received at that port 1,016,755 pieces of American sheetings, against 771,498 pieces for the same period of the previous year. Of drills, there were received 469,645 pieces against 548,180 pieces; and of jeans, 47,200 pieces, against 39,220 pieces. The imports from English, or any other sources, were far below these figures. There has been no such ratio of increase in the imports of cotton piece goods from any other country. It is stated by a well informed party from Shanghai that there was imported into that port, for the first nine months of this year, 233,739 pieces of cotton flannel, which come almost solely from this country, against 55,409 pieces for the same time last year.

James S. Fearon, the head of a large commercial house in Shanghai, who has recently arrived in this country upon a visit, is reported as having said that "within five years, American cotton cloth will have taken the place that Lancashire used to occupy in the Chinese market, and will have, on the score of price, sound and hon-

rest quality, a supremacy that the goods of no other nation will be able to challenge. From fair business competition, American cotton textiles have nothing to fear in China."

From all reports, all of our mills, manufacturing cotton goods for export, are fully supplied with orders for a great many months to come, at prices ranging from 4⅞ cents to 5 cents per yard, on the average. Manufacturers that are making this class of goods are adapting themselves to meet the peculiar wants of their foreign customers, in the matter of lengths of cuts, sizes of packages, etc. This, manufacturers have always been willing to do, but the necessity of a foreign trade has never been of so much consequence as it is now and has been of late years. Our manufacturers are as much alive to this as those in European countries, when the needs of trade demand it. American merchants, or handlers, of export goods are giving more thought and circumspection toward meeting the special requirements of foreign markets, as noted in the recent installation by the H. B. Claflin Company, New York, of three hydraulic presses, for the purpose of repacking goods for export. These presses are said to be the most powerful in this country, employed for this line of business.

We present in this article, certain statistics, which will be instructive, as showing the position of the United States as an export country of cotton goods. The custom house records of exports of manufactured cotton do not cover other than the three classes enumerated as "colored, uncolored, and all other manufactures." The statistics of exports to adjoining countries are now much more perfect and more to be relied upon than in former years, due to recent legislation on the part of Congress. Still, to some extent, the destination of exports through Canada are not always accurately shown, and it is probable that goods actually destined for countries beyond Canada are credited to Canada in the export manifests.

About 54 per cent. of the cotton goods exported for the first ten months of this year went to China, while a very large proportion went to other Asiatic countries.

Our exports of cotton goods for the first ten months of this year show a consumption for the export trade, of 306,000 bales of cotton, which gives the estimated consumption of cotton for the current year, for conversion into export goods, at 367,200 bales, which shows that one bale in every ten used in the manufacture of cotton goods in this country is converted into goods for a foreign market (total consumption of cotton in the United States in 1898-99 was 3,721,026 bales).

EXPORTS OF COTTON GOODS FOR 10 MONTHS ENDING OCTOBER 31.

	1897.		1898.		1899.	
	Quantities.	Values.	Quantities.	Values.	Quantities.	Values.
Colored	75,163,943	3,948,297	74,784,790	3,659,936	88,421,350	4,410,173
Uncolored	177,800,972	9,171,268	193,921,184	9,102,066	264,086,578	12,005,284
Total	252,964,915	13,119,565	268,705,974	12,762,062	352,507,928	16,415,457

We estimate that the 352,507,928 yards of cotton cloth exported for the ten months ending October 31, required 146,878,303 pounds of clear cotton for their manufacture, or 306,000 bales (480 pounds, net, per bale). This would give the estimated consumption for the full twelve months at 176,253,960 pounds, and assuming a consumption of 170 pounds of cotton per spindle per year, for export goods, it would show that 1,036,800 spindles are employed in this country on export goods alone, which is equivalent to one spindle out of every 18, running on this class of goods (total number of spindles in the United States, 17,938,000).

As can be easily reckoned, from the accompanying statistics, the value of exported goods for the first ten

months of this year, averaged 4.66 cents per yard.

Taking the total consumption of cotton in the United States for 1898-99 at 3,721,026 bales, of which about 372,103 bales (one bale in ten) are consumed for goods for export, we find that there are left for goods for domestic consumption 3,348,923 bales, which, at an average weight of 500 pounds to the bale, gives 1,674,461,500 pounds, which, divided by 75,000,000 as the population of this country, shows a consumption of 22.33 pounds of cotton per head of population in the United States, for domestic use alone. According to Thomas Ellison, the consumption of cotton, in 1898, in Great Britain, for domestic use alone, was about 345,500,000 pounds, which, divided by 40,000,000, as the population of Great Britain, gives a consumption of only 8.64 pounds of cotton per head of population.

While in the United States only ten per cent. of cotton consumed by our mills is exported in the shape of goods, 78.8 per cent. of cotton consumed in the mills of Great Britain is exported in this form. We think that we are approximately correct when we say that American exported goods are about three yards to the pound, while according to authentic statistics from English sources, the exports of goods from Great Britain average 5.16 yards to the pound.

—We hope to see the committee on Ways and Means in Congress better balanced than it has been, heretofore, in having members on it who are practically familiar with the business of the country. It is of the highest importance that this committee should have diversified talent, and while the legal profession should be well represented, so should the business, or manufacturing, element be considered. We, therefore, should be pleased to see Congressman William C. Lovering made a member of this committee, as representing more nearly the interests of New England than any other person that we can think of. Mr. Lovering is familiar with the tariff and the general subject of revenues.

—The proposed combination of the two great carpet manufacturing concerns, the Lowell and the Bigelow carpet companies, looks to us as being one of the best schemes of consolidation that has presented itself at any time during this era of consolidating different industrial concerns. These mills do not propose to have any watered stock in their scheme, but to capitalize upon actual value, under the laws of Massachusetts. By this combination, the control of the market on high grade Brussells, Wiltons and Axminsters will be substantially under one management.

STATISTICS.

Total consumption of cotton in United States, 1898-'99	bales		3,721,026
Cotton consumed in United States in manufactures for export. Estimated for calendar year, 1899	bales		367,200
Number of cotton spindles in the United States			17,938,000
Number of cotton spindles in the United States on export goods			1,036,800
Value of export goods from United States for 10 mos. ending Oct. 31, 1899	per yard		4.66 cents
Total consumption of cotton in Great Britain, 1898	bales		3,471,000
Cotton consumed in Great Britain in manufactures for export, 1898	bales		2,570,000
Number of cotton spindles in Great Britain			45,400,000
Piece Goods exported from Great Britain in 1898:			
White and Plain	yards	3,548,007,000	
Printed and Dyed	"	1,668,273,000	
Mixed material	"	121,000	=5,216,401,000
Average weight of goods exported from Great Britain in 1898	per yard		5.16 lbs.
Consumption of cotton in the United States for home use, per head of population, 1899	lbs.		22.33
Consumption of cotton in Great Britain for home use, per head of population, 1898	lbs.		8.64

THE TRADE IN WOOL.

Our readers among the wool manufacturers have followed the course of trade in wool for the last month with as an acute interest in its movements

as it has been possible for us to do. It is one of the most entertaining markets that we have ever witnessed, showing an exceedingly healthy demand from manufacturers throughout the world. Seldom has it happened that manufacturers in both the United States and Europe have been actively engaged in meeting a profitable demand for their products. From all present indications, these sound trade conditions will continue for some time to come, and the question is being raised as to where the raw material is coming from, especially for the finer class of woolen fabrics. European manufacturers are as much in want, if not more so, of wool, as those in the United States. For this reason, the price of wool at the current auction sales in London has advanced from 15 to 20 per cent. over that which closed the previous series of sales. Fine wools opened 15 per cent. higher, and crossbreds 20 per cent., which was a great surprise to all concerned, as relating to the latter class of wool, as the impression has prevailed that there was an abundance of crossbred wools in the world, enough to meet any ordinary demand.

Comparatively very little wool, as far as we can learn, is being purchased abroad for American consumption, due to the simple fact that prices are too high, and that foreigners are quite as willing, if not more so, to pay the advance, as American manufacturers. The Australian wools that are being offered at the present series of London sales consist largely of the early clips of this season, and represent some of the best growths of combing wools. We learn that purchases to a limited extent are being made for American account at Melbourne and Sydney.

Manufacturers will soon be forced to turn more of their attention to foreign wools than heretofore, owing to the extremely small stock of wool in our own markets, with nothing to fall back upon in the way of domestic wool, as everything has been pretty thoroughly cleaned up throughout the west, as well as in the eastern markets. The stock of wool in Boston is reaching almost a famine basis, considering the consumptive demand. The draft upon the stock in this market has been extremely heavy within the last six or eight months. The gross imports of wool, too, have been small, and the net imports have been practically nothing, so far as merinos, or fine wools are concerned. A little more life was shown in October, with net imports amounting to 1,450,000 pounds.

IMPORTS, EXPORTS AND CONSUMPTION OF FOREIGN WOOL, IN POUNDS.
For the first 9 months of the current year.

	First Class Wool.		Second Class Wool.		Third Class Wool.	
In warehouse Dec. 31, 1888....	20,812,166		17,790		37,110,061	
Imported 9 months ending Sept. 30, 1889	14,329,271		3,100,589		55,875,250	
		35,141,437		3,118,388		92,985,311
Exported 9 months ending Sept. 30, 1889	11,292,450		295,775		466,508	
Wit drawn from warehouse for domestic consumption,	6,219,525				4,802,321	
Entered for immediate consumption.....	3,036,821		2,413,363		55,409,742	
		20,548,796		2,709,138		60,677,571
In warehouse Sept. 30, 1889..		14,592,641		409,250		32,307,740

We give, herewith, certain statistics showing the imports, exports and consumption of foreign wool for the first nine months of the current year. Those relating to first-class, or merino wool, are especially interesting, showing the consumption of only 9,300,000 pounds for this period. Two-thirds of this was withdrawn from warehouse. All but about 3,000,000 pounds of our imports were re-exported. This

small consumption of foreign wool cannot last long, with mills running even at their normal capacity.

What is to become of the fine wool manufactures is a serious problem. Our domestic wools are going away from the fine merino to the coarser crossbreds, though we are pleased to note indications in certain sections of the return to finer wool sheep.

ADVANCE IN WAGES.

The prosperity of the cotton mills in New England is being reflected in the advance in the wages of the employees. An advance was made last spring, and an additional one will be quite prevalent before the close of the current year, on an average, probably of five to ten per cent. The Fall River mills, which seemingly set the pace for all others, have been exceptionally prosperous during the last year, as noted in the dividends that have been paid, in the liquidation of debts, and in the substantial increase of the surplus. Nearly $1,000,000 of debts have been paid off by these mills within the last twelve months.

While the price of the manufactured product has advanced, it should not be forgotten that the cost of the raw material and supplies has also advanced, making the margin of profits not so great as many are prone to think.

At present writing, a scheme of adopting a sliding scale for the establishment of wages in the Fall River mills is being discussed, upon the old basis, with a slight modification, of allowing a margin of 75 cents between the market price of regular print cloths, 64 by 64, 28 inch goods, and the cost of the raw material, middling upland grade, as quoted on the New York Cotton Exchange, which at present writing is 7 13-16 cents a pound. With this margin of 75 cents, the price of weaving is to be reckoned at 18 cents per cut of 45 yards.

The manufacturers of Fall River have made the following proposition for a sliding scale for the establishment of wages to be paid to the operatives in the mills of that city. This schedule is based upon the margin existing between the price of cotton and the price of 28-inch and 38½-inch 64 by 64 cloth, made from the standard yarns required to make 28-inch weighing seven yards to the pound.

"The standard by which wages shall be figured from time to time shall be 18 cents per cut for weaving 28-inch 64 by 64, and the margin shall be found by taking the cost of eight pounds of cotton at price of New York middling uplands, and 45 yards of 28-inch 64 by 64 print cloths, and 32.72 yards of 38½-inch 64 by 64 cloths at the market price averaged together.

"The margin fixing the price of 18 cents per cut for weaving and the existing schedule of wages shall be 75 cents.

"If the margin shall increase to 85 cents, then wages shall be increased 5 per cent. above said standard. If the margin shall increase to 95 cents, then wages shall be increased 10 per cent. above said standard. If the margin shall increase to 105 cents, then wages shall be increased 15 per cent. above said standard.

"If the margin shall decrease to 65 cents, then wages shall be reduced to 5 per cent. below said standard. If the margin shall decrease to 55 cents, the wages shall be reduced 10 per cent. below said standard.

"No change in wages shall be made oftener than once in six months.

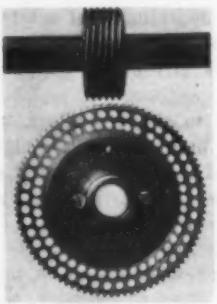
"If at the expiration of a six months' period the margin for the previous 60 days has risen or fallen to either of the standards fixed by this agreement, then at the beginning of the following six months the advance, or reduction, established by this agreement shall go into effect. Said period of six months shall begin the first Monday in January and July of each calendar year."

The price of print cloths at present writing is 3¼ cents for 28-inch goods, and 4⅞ cents per yard for 38½-inch goods, both 64 squares.

Improved Roping Gear for Woolen Mules and Operators.

A device of much interest to woolen spinners is shown in the accompanying illustrations.

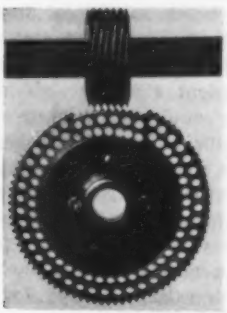
This improved roping gear is the invention of George Smethurst of Maynard, Mass., who for a number of years was overseer of spinning in the Assabet Mills, but is now devoting his time to the introduction of this mechanism, and from the favor with which it has already been received, it seems probable that there will be a large demand for it, because it effects an important improvement and overcomes a difficulty which is recognized as a serious one.



The right hand view represents the yielding section forced back on the points of the teeth. The other represents the wheel intact.

The practical spinner will appreciate the advantage of the device by a glance at the illustration. The improvement consists in the yielding section of the gear. This section when it comes in contact with the face of the teeth of the worm wheel, gives or yields so that the roping gear does not become bruised or stunted. The solid gear after a while becomes bruised to such an extent that it does not start on time and consequently more roping is paid out to the spindles than intended, and frequently is not detected until the roping runs out the whole length of the stretch. The spinner then finds that a lot of heavy yarn has been spun and gone into the work. The gear is then moved around so that a fresh section is presented to the worm gear, but after a while the same difficulty is repeated with the same results, until finally the whole circumference of the gear has been worn out. This improvement we believe to obviate that difficulty, and it has been demonstrated by experience that it accomplishes its purpose perfectly. The mule gears free, and rolls do not bind, and no twists are liable to be made under the rolls, and the most important of all is the gear starts on time and prevents heavy yarn.

The device is covered by patents issued April 11, 1899.



Of course it frequently happens that the worm gear meshes free, but when it strikes on the points of the teeth, as very frequently occurs, the yielding section prevents bruising until the gears slip into mesh freely.

A number of woolen mills have been testing this roping gear for some months, and without exception it has proved satisfactory.

This device is applicable to all woolen mules and operators of this type, and the price ($3.00 for the gear) is very reasonable when the advantage to be gained is considered.

Mr. Smethurst is so confident that his gear will convince anyone who tries it that it is a good thing, that he will send one on approval to any mill which wants to give it a test before ordering.

Textile Instruction by Mail.

Paper read by C. P. Brooks, New Bedford, Mass., before Montreal meeting of the New England Cotton Manufacturers' Association.

The subject of textile education has been discussed frequently at the meetings of this association.

Judging from the number of textile schools, which for a lack of a better name, I will call "residential textile schools," now in operation or being promoted, apparently the subject has met and is meeting with the highest approval of textile manufacturers.

A residential textile school is limited in its scope. At its best it is practically and essentially a local institution. In the interests of the state or city that founded it, it is best for it to be developed as a local institution. A small proportion of its students come from a distance. For each day student there are six or more evening students, workers in the local mills and machine shops who combine work and study—working in the day time, studying at night. The reason for the small numbers in the day classes is that there are few men who can afford to leave their work, lose their salary and pay for tuition, board and rooms in order to devote their whole time to studying the day course of instruction in a textile school, while there are thousands of men who hold responsible positions, or who are aspiring to responsible positions to whom the earning of a daily wage is an absolute necessity to their existence; or who hold a position that they do not desire to sacrifice, and yet who desire to attain a technical education and are willing to devote any amount of time and any possible sacrifice to obtaining same.

In the cotton mills of America there are plenty of men who are working in one department, or on one machine, and who know nothing of other departments or other machines, and yet they are well aware that unless they obtain this knowledge they cannot hope to be promoted to positions of responsibility. There may be no textile school in their vicinity, and they have not the means to attend a residential textile school. They are sometimes repelled when they seek information from their overseers, and it is a difficult thing for a young man of this personality, without influence or wealth, to obtain the necessary information and to climb the ladder of success.

Not only so, but there are many persons whose general education is good, who even have graduated in the higher branches of scientific and classical education, who are placed by accident or influence in a position of extreme responsibility, and who feel the need of knowledge in special branches of their work that they have not an opportunity of attaining simply because they cannot leave their positions in order to attend a textile school.

Alike to the struggling, ambitious worker in his desire for higher position and higher pay, to the man who is already in a good position and wishes to perfect himself, or bring his knowledge up to date; to the manufacturer who wishes to branch out in new lines of industry, to the jobber, the converter, the dry goods merchant, the mill supply dealer, the textile machinist or any person connected in any capacity or in any way with textile manufacturing, there is a want that the residential textile school, admirable as it is, does not fill. It is to these men that a correspondence school appeals.

The method of giving instruction in textile correspondence schools generally adopted throughout America is simple and effective.

Specially prepared instruction papers are printed and issued to each student, which contain in simple expressed, clear and concise descriptions and carefully worded explanations of the subject matter under consideration. If it is a machine, the principles of its construction, its objects, the use of each part and each motion,

the method of operating it, and a score of other details in connection with its construction, and economical and effective operation and management are explained.

Numerous diagrams are issued for illustration, and it is endeavored to make the description as clear to the student as if he had a machine in front of him. The fact that they are printed gives an advantage. It is very easy to mistake the meaning of a lecturer, or fail to grasp some of the facts that he wishes to teach, but by having a printed lesson the student can refer to it over again and again, if necessary, until he becomes thoroughly acquainted with the subject. It is also necessary that more care and attention should be given to the preparation of the lessons that have to be printed and issued in large numbers and which cannot afterwards be altered without considerable expense, than to a mere oral address.

After the lessons have been studied, any point on which the student wishes to have further information is brought to the attention of the instructors by means of specially prepared inquiry blanks which are supplied for that purpose.

Frequent test questions or "quiz" papers are given. When the student feels that he has obtained the necessary information to enable him to understand the topic thoroughly, he has sent to him a set of examination papers which he has to work out and send to the school.

When these answers have been received, the instructor carefully corrects them, indicates errors, makes suggestions and criticisms, points out how to remedy mistakes, and endeavors to make the student feel that the comments are for his best interest.

Each student works independently —quickly or slowly as he wishes.

Each student is provided with sufficient work to keep him busy while his worked papers are passing through the mail, still it is optional with him when he shall return the next worked paper; either the next week, the next year or ten years hence.

The papers are graded carefully to certain percentages and if the required mark is obtained the student is passed forward to the next lesson; if not, he is required to review his studies and send in other examination papers until he attains a mark that will enable us to conscientiously certify that he is competent. These written lessons have an advantage over personal instruction, inasmuch as the student has them constantly before him, to refer to when necessary. This is especially desirable for backward students, or those who do not learn easily.

After the lesson is prepared as directed, it is sent to the school, together with such questions as the student may wish to ask. The teacher examines everything with the utmost care and then returns the papers, together with such suggestions and criticisms as will enable the student to understand the work thoroughly. In this way every mistake is pointed out and everything learned correctly.

Numerous blanks are supplied for various purposes so that the student may have as little trouble as possible in obtaining further information on any point not clearly understood, or to any request for information that has a direct bearing on the section of the subject that he is studying.

The system is both cheaper and immensely superior to studying from text books. The text books which refer specially to American machinery and processes are very few in number, and where such books are of any value, the author is usually so deeply learned in his subject that he omits to make it sufficiently plain to be understood by the ordinary student. Advanced mathematics, chemistry and other sciences are found in these volumes, until they are almost unintelligible to an ordinary reader, and the student before having read very far usually closes the book in disgust, having no one to refer to, or inquire

from, to explain the difficult points.

The library of books that covers all the points mentioned in our lessons cannot be purchased, as they are based on the experience of men which has not previously been published, but a library of books that even approximately covers our course would cost considerably more than the fee charged.

It is not necessary to make a comparison of correspondence schools with a regular residential textile school; each has its own field of labor. The residential school caters for the local mill help and for those men who are fortunate enough to be able to defray the expense of a two years' or three years' course of instruction which occupies their whole time, and if taken in a well equipped and well managed institution with a good staff of instructors, is undoubtedly one of the very best methods of obtaining a textile education.

The correspondence school on the other hand aims at educating those men who have their living to earn, and who wish to learn while they earn; who study at night and put into practice in the day time what they have been studying.

The Spring Season Styles.

(Reported by the European Pattern Supply Co., 32 Greene St., New York.)

The expectation of the woolen manufacturers for a lively business in spring goods has been fully realized, and the prosperity which has now lasted several years will doubtless increase and remain for a good many seasons more to come. Wherever woolen goods are manufactured there is great activity, mills running in full force, and in some instances the manufacturers having to do night work, in order to fill the orders which have been placed with them. This is principally the case in those manufacturing towns where medium price goods are made, and in this class of articles it is absolutely impossible to fill the demands.

On our European trip it was of special interest to us to visit Bradford, England, and its surrounding manufacturing towns. In order to demonstrate to what effect the high American tariff had interfered with this part of the textile industry, we must admit that we were disappointed. We had expected that the loss of the American market would greatly handicap the English manufacturers, but it appeared as if the American market was no factor to them whatsoever. We have seen the same activity there as in other places, and it is certain that the English commission houses have found ready outlet in other parts of the world for the goods which have, in so enormously large quantities, been exported to America. The mills in Belgium, but principally in Germany and Austria, have for many years been engaged to their fullest capacity, and the same can now be said of England and Scotland, and it is only in rare cases that a mill can be found that is not filled up with orders to the full extent of its looms.

With all this activity, however, and with great similarity of a number of lines, both in quality as in production and finish, there is a wide range in prices. We have seen goods in Germany and others in England which were almost identically the same, at a variation in prices which was astonishing, and even in the same markets we have compared similar sample lines and found the same difference in quotations, although the manufacturers had their production fully engaged. These price differences have been effected by the speculative business in raw material, which is still going on, and the manufacturers who have a sufficient capital to pile up a large quantity of raw material have had the better over those of their competitors who are not fortunate enough to possess the requisite finances.

It does not strike us as very brilliant for a business man to sell his production below general market prices simply because he has purchased his raw material at a low price, and it can be stated that such cases are only ex-

ceptional. The general range of prices for all textile fabrics has advanced all over Europe, and the difficulties which were encountered last fall in the attempt to advance prices have vanished altogether, and the trade has grown accustomed to the higher quotations.

In one of our previous articles we predicted that the medium price goods, those which are made of wool and shoddy, and of cotton warp and shoddy, would be in great demand as soon as raw wool advanced in price, and we have seen that such is the case wherever we went. Manufacturers who had devoted their labors to pure woolen goods are now making goods of lower material, and a great many of those who, in former years, had only a part of their mill reserved for shoddy and cotton warp goods are making such articles now exclusively. The price of shoddy has also advanced, and naturally the price of shoddy goods, and if the demand, which in Germany is principally occasioned by the large export business, continues to increase, there is no telling when and where the prices of manufactured goods will cease to advance. The export business from Germany to the Asiatic countries has been largely extended. Where in former years the business was risky and unsatisfactory, on account of having been carried on with unreliable commission houses, there are now direct purchases made which do not endanger the goods and their owner to the extent as in case of consignment. Another effect of the ever-growing business is the building of a large number of mills. A great many have been completed, and a great many more are in process of construction.

As far as the character of the European lines is concerned, we must say that we cannot find a general novelty.

In suitings we have seen the indistinct, as well as the plaid designs, and, according to opinions of leading manufacturers, the latter will be in fashion for several more seasons. The favorite colors are gray, grayish green, and in a great many instances, even a pale green, and it will naturally follow that these shades will soon be adopted by the American market. We have also seen the stripe effects for suitings, but only in limited numbers, and it is quite certain that they will not be in demand for any longer period than in former years, which was always limited to a season or two.

Pantaloonings are being offered in all sorts of stripes; predominating amongst them are very wide patterns, and especially in England and Germany have we seen such wide trouserings, which are almost distasteful to the American eye. There are, however, some of these broad effects, which, by avoiding contrasting colors, look very handsome.

In overcoatings, we have not seen anything particularly new, excepting some new shades, such as gray and greenish gray, which are offered in suitings and some new weaves in covert-like designs.

When we observe the different countries separately, we must state that England is making a surprisingly larger line of cheviots than formerly, and less worsted goods, but this change was expected, considering the depreciation of worsted fabrics to worsted and cotton-mixed fabrics, and all the way down to the so-called cotton worsteds, which are made of nothing but cotton, and finally reaching the cottonades. The English have great skill in producing patterns on the lowest grade of goods, imitated from the best of fabrics, and the consequence is that a man who will pay two shillings and six pence can be seen wearing the same pattern as the man who has paid ten times the amount for his trousers, and this is the reason that the real high and fashionable grades are now being made in cheviot, because such goods cannot be depreciated by imitation, such as worsted goods. But, also, cassimeres have a good demand and both materials give the manufacturer a chance to fully develop his ideas in the unlimited variety and construction of designs. Plain mohair goods, and the

same combined with botany worsteds, have been made in very pretty designs.

The country around Bradford is busy manufacturing meltons and twills at low prices, and the amount of exportation of these goods to South America, the colonies and to Asia has almost triplicated.

In Germany we have seen a great variety in fabrics which includes everything that material, weaving and finishing can produce. The German manufacturer grows from year to year, and it is remarkable to us how he expands, by inventing and creating new machinery. Particularly in finishing have we seen marvelous results, and amongst the latest inventions there is a machine which simultaneously shrinks, presses and finishes cloth. This machine makes the separate process of sponging superfluous and does away entirely with the flat cloth pressing. This machine, which is a German invention, has been patented in all countries on the face of the globe, and, as far as we have learned, the Curtis & Marble Machine Co. of Worcester, Mass., has procured the right of manufacturing and selling the same in the American market. The machine is in operation in Germany, Austria and England, and works to fullest satisfaction.

The production of cassimeres is larger than of worsted goods, and apparently for the same reason as in England. Suitings are being offered in plaids, small checks and also in stripes and the same are made in nearly the same colors as in England, excepting that we have seen in the German lines very fine shades of modes and drabs. In worsteds, they also use gray, greenish gray and very pretty combinations in light gray with lilac or lavender. The latter colors are produced by silk threads.

—It is claimed that Samuel Mayall, who came to this country in 1788 or 1789, was the first man who carded wool into rolls by machinery in the United States.

Weft Supply Mechanism for Looms.

There have been several inventions of late referring to the automatic supplying of filling to looms, so as to avoid the loss of time in the stoppage of the machine when a new supply of filling is required. The practicability of these inventions, of course, is an unknown quantity outside of the experimental room. They have not been introduced into mill practice sufficiently to establish for them undisputed merit.

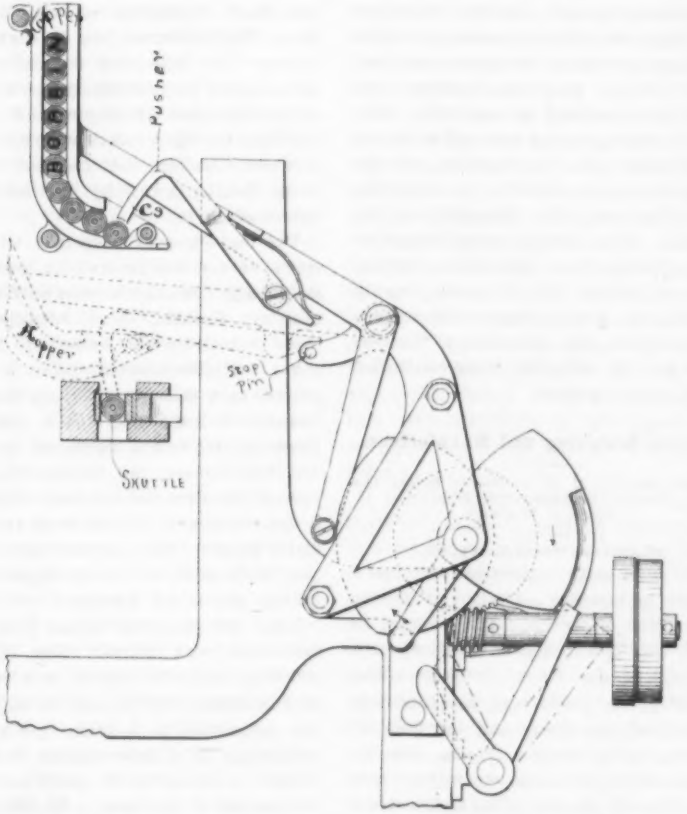
We illustrate one mechanism, though withholding any opinion regarding it, which stops the loom in case of a failure of the weft by breaking or exhaustion, and then trips it into action again. Upon any failure on the part of the weft, the device ejects the shuttle from the lay and introduces another shuttle containing a full supply of weft. The correcting and restarting mechanism is combined with bobbin supplying devices, in which the bobbin spindle, or other device carrying the filling is, without stopping the loom, automatically inserted into the shuttle in the shuttle box, the shuttle being self-threading, and so constructed that the defective bobbin is ejected from it by the incoming full bobbin.

The illustration that we furnish is a section of that portion of the mechanism showing a part of the end of the loom for operating the bobbin supplying devices.

The obvious advantages of the present invention arise from the facts that the two mechanisms—the weaving mechanism and the bobbin-supplying mechanism—are not operated at the same time, but each mechanism is automatically tripped into action concurrently with the stopping of the other. It hence follows that the weaving mechanism may be run at any practical high rate of speed, because while it is running the bobbin-supplying mechanism is at rest, and, on the other hand, the bobbin-supplying mechanism may be run at any such slow rate of speed as may be nec-

essary to insure its certainty of operation, because while the change of bobbins is being made the weaving mechanism is at rest.

The successful accomplishment of the results sought for in the present mechanism requires the presence in the loom of a stopping device susceptible of being tripped into action by the breaking or running out of the weft-thread and adapted to invariably bring the operative parts of the loom to rest with the shuttle and lay in prescribed positions.



By referring to the illustration, there will be seen a magazine or hopper adapted to contain a plurality of bobbins with the free ends of the several threads secured to a pin, and a self-threading shuttle so constructed that the act of inserting a bobbin into it will effect the ejection of the bobbin previously contained in it. The hopper is carried upon the extremity of the upper arm of a bell crank lever, the latter being pivotally mounted by means of a pin. The transfer of the lower-most bobbin from the hopper into the shuttle is effected by a downward vibration of a pusher, which is pivoted upon the arm of the bell crank lever. During the concluding portion of the downward movement of the hopper the shank, or short end, of the pusher, is carried into collision with a stop-pin, affixed to an arm projecting from a supplemental frame. By such collision the pusher is rocked upon its axis and pushes the bobbin from the magazine into the shuttle, the bobbin previously contained in the shuttle being thereby ejected through the open-

ings in the bottom of the shuttle, and in the bottom of the shuttle-box.

There is another invention for automatically supplying to a loom a full shuttle, cop, bobbin, or other holder for the weft or filling when the holder in the loom shall have been wholly or nearly exhausted; and it has for its object to provide for supplying weft of different colors or kinds to looms where a plurality of shuttles are employed and brought into play to weave in fillings of different colors or kinds at the proper times by known mechanisms. Each magazine holding the weft has operating in connection with it a vibrating carrier adapted to take a bobbin-box from its magazine and deliver it into the shuttle, the incoming box displacing that formerly in the shuttle. The carriers have independent intermediate operative devices through which the vibrating lay in beating up acts to operate the respective carriers, the operation of the carriers and the selection being controlled by electrical means.

Carpet Designing and Manufacture.

Paper read by M. F. J. Mayer before the Society of Designers, Kidderminster, England.

(Continued from November.)

We come next to the class of carpets known as tapestry. Looked at merely as a piece of woven fabric this is, to all intents and purposes, identical with a piece of one frame brussels. The whole of the surface of the carpet is formed of the warp, and the general weave is the same. It can also be made either with the brussels or wilton pile surface, according to the wires used. There, however, the resemblance stops. A brief examination of the pattern will show that it is produced by a totally different means to the jacquard. The pattern is obtained by printing the colors on the yarns which form the warp before the carpet is woven. To do this the undyed yarn is wound around large drums. The designs must be done to standard sizes. In the matter of color the designer has as much liberty as he chooses, but must be guided in his use of color by the requirements of a cheap class of carpet that, whatever its commercial value may be, cannot rank high artistically. The successful drafting of tapestry designs requires a certain amount of technical experience. The printing of the drums is rapidly done, and there is always a large running together of the colors, the dark shades holding their own best and impinging on the lighter ones. The designer has to make allowance for this and counteract to some extent by judiciously thickening, or, in the case of single cord lines, doubling the light colors where his experience tells him that they are likely to be beaten away by the adjacent spaces of dark.

The last class of carpets I wish to speak of are the reversibles, comprising all the varieties known as Kidderminster, Roman, etc. Speaking of these a well-known writer on design says: "Kidderminster carpet (a carpet not now made by even one Kidderminster manufacturer) is a common fabric suited to the bedrooms of middle class houses; but the art capabilities of this material are very small, as it can only have two colors in any line in its length. This carpet consists of two thicknesses, which are imperfectly united, and is not durable."

I am not prepared to say that this statement was untrue when it was written, but as it appears in a widely read standard work, and is certainly not calculated to improve the public estimation of Kidderminster carpets, I may be permitted to point out how inaccurate it is now. In the first place, as many of these carpets are made in Kidderminster as in any town in the kingdom, and to my knowledge they have been made there continuously for the last twenty-five or thirty years. In the second place, it is not a pretentious carpet, but some varieties are used with the approval of competent critics with satisfactory artistic results. It may interest you to know that the lady whose name appears in our list of honorary members, H. R. H.

Princess Louise, has ordered some for her own use, of the Roman make; several of the same make are in use at Balmoral, also. As to the art capabilities of the material being very small, William Morris proved the reverse of that twenty years ago, and some of the charming little designs which he did for the fabric are still largely and deservedly in demand. The statement that it can only have two colors in a line in the length must be a slip resulting from a misunderstanding of the mode of manufacture.

These are jacquard carpets, but contrary to the case of brussels and wiltons, the surfaces are formed by the weft, which is put in with shuttles and manipulated by the jacquard to produce the design. These carpets are made in two and three plies. In the two plies two shuttles of yarn are used simultaneously in each lash, and so two colors are available in any line across the carpet. In the three plies three shuttles are used together, and three colors, of course, are available in a line. Extra effects are sometimes obtained by using differently colored warp threads.

I think I have now said all I need of the various makes of carpets as regards the designs. How to work on the ruled paper is the first thing an apprentice to carpet designing has to learn, and to do it in a proper, workmanlike way the best, almost the only, means of obtaining the requisite technical knowledge is to spend a few years either with a professional designer or on the staff of a manufacturing firm. Impracticable ruled papers are an annoyance to the manufacturer, and the attempt to translate them generally disappointing.

It usually takes three or four years' practice for a student to overcome the mechanical and technical difficulties and to grasp sufficiently the resources of drafting to enable him to interpret properly a design of average difficulty which may be given to him in outline. Some styles of designs offer exceptional difficulty and require considerable experience and artistic feeling to draft them satisfactorily.

Before closing I should like to say a few words respecting the designs of Oriental carpets.

The fine antique specimens which have come down to us, especially those of the fifteenth and sixteenth centuries, are universally esteemed as examples of what perfect carpets should be, and deservedly so. One has never learned all their secrets, discovered all their half-hidden beauties and surprises, or fathomed all their suggestions. In their way of conveying suggestions beyond what is actually expressed they are veritable poems. In perfect harmony with all the essentials of an ideal carpet, as regards plan, color and treatment, and without in the least invading pictorial domains, they succeeded in weaving vivid suggestions of the life around them—incidents of the jungle, flower strewn fields, mysterious forests, mythological imagings, etc., into perfectly appropriate ornaments. The charm is closely akin to that of old tapestries. They draw us insensibly into dreamland; it is the spell of poetry reaching us through form and color.

I have indicated already the limitations imposed on modern carpet designers by the relation in which they stand to architects, decorators and furnishers, but the prejudices of a partially educated public impose equally irksome and much less reasonable limitations. One fixed idea that an intelligent study of the subject matter and treatment of the best Oriental carpets—excepting of course, those produced under strict Mahommedan influences—would surely tend to dispel, is that outside of flower forms and more or less abstract ornament there is nothing "proper" for carpets. My own opinion is that if we learn the secret of the proper treatment, as the designers of old Persia and India did, there is no reason why our choice of motives should be less wide than theirs, and why we should not introduce elements that would appeal as well to one's imagination as to one's taste for form and color. We are told, for in-

stance, that one's sense of fitness is violated by placing animal forms where one has to tread. As far as my personal feelings go I have just as strong an objection to tread on tulips or orchids, if the actual presence of such flowers is represented to me. But, as William Morris said, "a carpet should give—not representations, but suggestions," and, as a matter of fact, it is quite practicable to treat floral forms so that one receives no impression of treading on anything more or less than a carpet. And any natural forms so treated seem to me legitimate, provided that in themselves they do not suggest anything unpleasant or incongruous.

Meeting of Woolen and Worsted Overseers.

A largely attended and most interesting meeting of the National Association of Woolen and Worsted Overseers was held at the United States Hotel, Boston, November 15. Every New England State and several of the Middle and Western States were represented by delegates. The financial condition of the association was shown to be very satisfactory, the balance of funds on hand being $225.61.

The following were admitted to membership: Edward F. Dudley, weaver, Walnut Hill, Mass.; Frank Perkins, weaver, Stoughton, Mass.; John H. Crowther, carder, Auburn, N. Y.; George A. Crowther, spinner, Auburn, N. Y.; James B. Jones, finisher, Philadelphia; E. R. Johnson, dyer, Uxbridge, Mass.; Frank Appleby, superintendent, Hampden, Mass.; W. J. Pearce, dyer, Norwichtown, Conn.; Chas. Spurr, dyer, Stoughton, Mass.; Lawrence H. Love, weaver, Hyde Park, Mass.; William O'Brien, dyer, Holyoke, Mass.; William Pender, finisher, Worcester, Mass.; Edward Oakes, spinner, Dedham, Mass.; William Taylor, weaver, Byfield, Mass.; Mathew Holloran, carder, West Fitchburg, Mass.

The following men were admitted to honorary membership: E. Saxe, New York; William A. Moulton, superintendent, Palmer, Mass.; Benjamin Booth, card clothing manufacturer, Philadelphia; F. W. Phelps, superintendent, Old Town, Me.

Thomas F. Brennan, Dedham, Mass. was elected president for the ensuing year. He had previously served the organization as treasurer and vice-president. The other officers elected are as follows:

First vice-president, Louis Carmack, Providence, R. I.; second vice-president, Herman Amback, Manton, R. I.; third vice-president, Charles M. Hurst, Providence; secretary, John Mulrooney, Plymouth, Mass.; treasurer, Albert E. Jones, Uxbridge, Mass.; secretary Beneficiary Department, George W. Burr, Lowell, Mass.; trustees, J. H. Pickford, Leominster, Mass.; J. O. Crowley, Hyde Park, Mass.. F. H. Gresham, Martinsburg, W. Va.

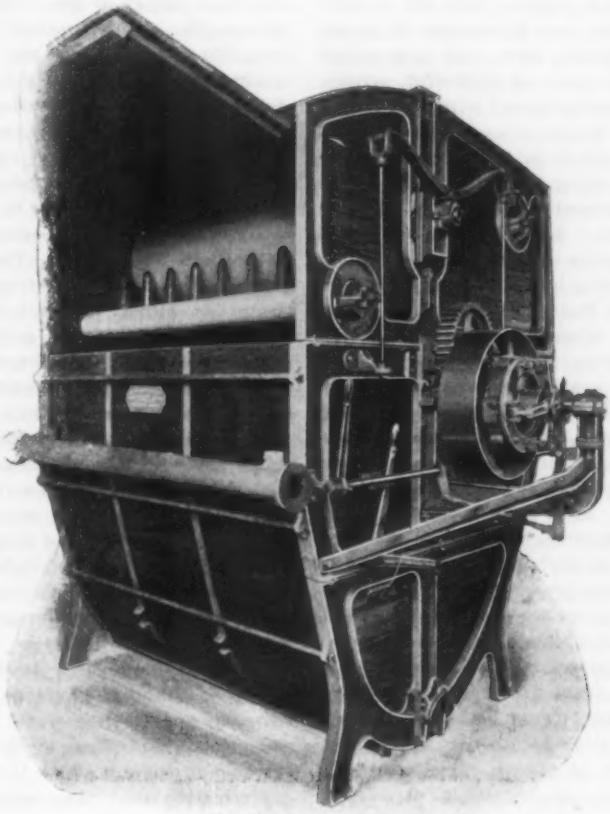
The New Rodney Hunt Cloth Washer.

The Rodney Hunt Machine Co., Orange, Mass., have recently brought out a new pattern of cloth washer, which is built in three sizes for four, six and eight strings of goods, and embodies the improvements which have been suggested by their long experience in this class of machines. They have had in mind great capacity, rapid work and thorough rinsing, whether light or heavy goods are run, and at the same time have not forgotten economy in space, in power, soap and installation. All the many good points of their previous machines are retained in this model, and new features have been added. Nothing has been spared in material and workmanship. An extra heavy iron frame is made in four parts for convenience in handling, and when bolted together has the strength and rigidity of one casting. The casings are of the best Georgia pine.

Careful study has been given to the shape, so that the goods may have a natural and easy position without strain, and as a consequence of this, a marked saving has been effected in the power required to run it.

The main rolls, which are made of the best selected rock maple logs from untapped trees, are fitted with extra large shafts and wing gudgeons. They are also provided with elliptic springs and adjusting attachments.

The main bearings for both top and bottom rolls are adjustable, easily removed and are automatic ring oiling, supported on outside of the frame,



thus preventing any possibility of dripping oil on the inside. The top shaft bearings are adjusted to obviate main rolls coming in contact.

The power is controlled by a rod extending the full length of the machine, with shipper handles which enable the operator to control it from either side.

The suds box is provided with gate and apertures at the bottom, which, when open, allows the suds to pass down into the washer among the goods and distributed as desired, until the goods are ready to be washed off, when, by opening the end gate automatically, the suds distributer is closed and the waste, soap and dirt is drawn out through a special device for the purpose of ensuring expeditious washing and cleaner goods. The soap can be saved and used again, if desired.

Oak pin guides are supplied unless porcelain ring guides are requested.

The company has issued a circular, bearing especially on this machine and showing different views, giving dimensions, etc., and will be mailed upon application.

The Cultivation and Manufacture of Indigo in Bengal.

CHRISTOPHER RAWSON.

(Continued from September.)

The indigo press consists of a rectangular strongly made box, the framework having on all sides numerous perforations. Each factory has a number of presses in operation. They stand upon heavy beams of timber or strong iron girders. The box is well-fitted with two thicknesses of strong closely woven cloth, and is arranged under a pair of powerful screws, which can be turned with long levers. into the box to a depth of 9 in. to 13 in., according to its consistency; the amount being regulated so as to obtain a pressed slab of 3 in. to 3¼ in. in thickness. The screws are turned very slowly at intervals extending over several hours. Unless great care is taken the cloths burst and indigo is lost. When no more liquid is seen to be oozing from the block the pressure is gently and evenly released. The slab, which now contains about 70 per cent. of water is put on to a frame, and cut by means of a brass wire into cubes of about 3 in. to 3¼ in. in size. Each cube is stamped with the mark of the factory and the number of the day's boiling, and taken to the drying-house.

The drying-house is a lofty, well. ventilated building, containing a number of shelves (about a foot apart) of light bamboo or wire netting. The cubes are placed on these shelves about half-an-inch apart, and left for a period of two or three months to dry. The drying takes place very slowly, as at this period of the year the humidity is high. Strong currents of air are not permissible, otherwise the cakes crack and the value of the indigo in the Calcutta market is thereby much depreciated. There are usually a number—more or less—of cakes broken, but the greatest care is taken to keep them whole. During the drying a considerable amount of ammonia is evolved, and the cakes become covered with a thick growth of fungus. From several experiments which I have made, the ammonia and fungus are not produced at the expense of the coloring matter, but from the soluble extractive matter remaining in the cake after pressing. When dry the cakes are brushed and packed into cases or chests, which are usually made of well-seasoned mango-wood.

Water Used in Indigo Manufacture.—For the production of indigo an abundant supply of good water is indispensable; every pound requires from 300 to 500 gallons, and upon its quality largely depends the successful working of the operations. The chief sources of supply are river water, lake water, and rain water. The rivers of Behar generally flow from Nepal in the North, in a south-easterly direction, and empty themselves into the Ganges. The largest is the Gundak, on the West. Rain water is either collected in large tanks dug in the ground, or in natural depressions, forming "chowrs." Much of the soil in Behar is calcareous, and it frequently happens that the rain water in these tanks and chowrs contains as much mineral matter as the neighboring river. Lake water varies greatly in composition according to the rainfall. In times of drought lake-water often contains much organic matter in solution and suspension; such water is always considered to give bad results in indigo manufacture, both as regards produce and quality. Taking the average of about seventy samples, the water used for manufacturing indigo in Behar may be said to contain about 15 grains of solid matter per gallon, ranging from 4 to 28 grains. The hardness, which, almost without exception, is due to carbonates of lime and magnesia, averages 6 degrees, with a maximum and minimum of 14 and 2 respectively. The majority of waters examined, however, only showed a variation of 4 to 8 degrees of hardness. Most of the waters, in addition to carbonates of lime and magnesia, also contain small quantities of carbonate of soda. Sodium chloride is only present to the

extent of about half a grain per gallon. With few exceptions the waters examined were practically free from nitrates. On account of the heavy rains and the melting of snow in the Himalayas, the waters of Behar vary considerably in their composition from time to time. All planters agree that, other things being equal, fresh rain water is much the best for indigo manufacture, and that more or less stagnant water containing innumerable living organisms—vegetable and animal—is decidedly detrimental to the production of good indigo.

The Color-giving Principle and Solution Obtained in Steeping.—Notwithstanding the great amount of time that has been devoted to the subject, it is not definitely known in what state of chemical combination the color principle exists in the leaf of the plant nor the precise changes which take place during its conversion into indigo blue. It was formerly considered that indigo blue existed ready formed in the plant, and at a later period that it was present in the form of reduced indigo or indigo white. Many years ago Dr. Schunck, in his classical researches on the "Formation of Indigo Blue," proved both these views to be incorrect. He found the leaves of certain indigo-yielding plants to contain a peculiar compound which he named Indican. Some months ago, Dr. Schunck kindly showed me a number of beautiful specimens which had been treated in various ways to illustrate the existence of such a body (capable of forming indigo) in the leaves of the living plant. If placed in boiling alcohol, the principle was entirely removed and the leaf left of a yellowish grey color. When the vitality of the fresh leaf had been partially destroyed, by being punctured, or frozen, or treated with acid or cold spirits of wine and then immersed in boiling alcohol, those portions which had been affected became blue and the other portions were grey or colorless. Indican, which belongs to the class of bodies termed glucosides, is capable of being split up into indigo-blue and a kind of sugar. It has recently been shown that this change does not take place directly, and that indican itself does not contain the molecule of indigo-blue. A theory of the steeping process which appears to obtain generally is that by fermentation the glucoside, indican, is decomposed into indigo-blue and a peculiar kind of sugar, and that the indigo-blue is then by the action of further fermentation reduced to indigo-white, which remains in solution until it is afterwards precipitated by oxidation in the beating vat. This simple view of the process, however, is not borne out by facts. If the liquid running from the steeping vats contained indigo-white in solution it would be oxidized to indigo-blue in very much less time than is the case. When indican is decomposed by hydrochloric acid in the absence of oxidizing agents a substance is produced which cannot be converted into indigotin; and further, that indigotin is formed from indican by the action of hydrochloric acid in the presence of an oxidizing agent, and that these conditions—the presence of a hydrolyzing agent and of an oxidizing agent at the same time—are necessary for the production of indigotin.

Much difference of opinion prevails as to whether fermentation is necessary for the production of indigo-blue, or whether the fermentation is merely a consequence of the steeping process. It is possible to produce indigo-blue from the plant under such conditions that bacteria could not exist, and this would tend to show that fermentation was not a necessity. On the other hand, Alvarez professes to have discovered the micro-organism which produces the indigo fermentation. He cultivated the microbe and found that it induced indigo fermentation in a sterilized extract of the leaves, which remained unaltered when freely exposed to the air without inoculation. Breaudat attributes the formation of indigo to a "diastatic" fermentation, and not to the growth of a micro-organism. From

my own observations I am inclined to think this is the correct view, although the liquid running from the steeping vat contains innumerable micro-organisms of a form similar to those described by Alvarez. Van Lookeren Campagne considers that the decomposition or transformation of indican takes place in the interior of the leaf by the action of bacteria; indigo-white diffusing into the liquid.

The liquid obtained on steeping the plant contains a number of substances—organic and inorganic—in solution, among which the most important the indigo-forming principle, exists in very small proportion. An extract of indigo leaves has been variously stated to possess an acid, an alkaline, and a neutral reaction, but I have never seen any statement made regarding the indicator used for determining this condition. Many substances which exhibit an acid reaction to some indicators are alkaline to others. This is the case with an extract of indigo leaves. I found a fresh decoction of the plant to be neu tral to both red and blue litmus paper. It was decidedly alkaline to methyl orange and acid to phenol-phthalein. The liquid contains a large amount of lime, magnesia, and potash; chiefly in combination with carbonic and organic acids. I have analyzed a number of samples of "liquor" and found the solution to contain on an average 0.55 per cent. of dry solid matter. (The maximum was 0.79 per cent., and the minimum 0.35 per cent.) This amount corresponds to 55 lb. per 1000 gallons. Nearly one-half of the total solids consists of mineral matter; bicarbonates of lime, magnesia, and potash predominating. The bulk of this matter, and practically the whole of the coloring matter, is derived from the leaves. Even the fine stems yield but traces of color. In order to show the relative amount of matter extracted from leaves and stems, 100 grms. of each were separately steeped with ten times their weight of water in the usual manner. The plant contained 38 per cent. of leaf, and the results are also calculated for the whole plant.

It will be observed that the indigotin only equals one twenty-fifth part of the total matter extracted from the plant. The amount corresponds to 5.33 oz. of 60 per cent. indigo per 100 lb. of plant. In several other experiments I found the leaves to yield from .30 to .60 per cent. indigotin. The average amount of indigo produced on a manufacturing scale per 100 lb. of plant is about 4 oz., but the figures vary greatly in different factories and also at different times in the same factory. In many cases the variations are evidently due to the varying amount of leaf and stem constituting the plant, and it might naturally occur to one that it would be preferable to steep the leaves only. A process in which this idea was carried out was patented many years ago by Olpherts, but for some reason or other it has not been adopted.

If an alkali such as lime, soda, or ammonia be added to the liquid from the steeping vat, the carbonic acid, which is present in great quantities, is neutralized, and calcium and magnesium carbonates are precipitated. At the same time, the character of the indigo-yielding body appears to undergo a change, as it may now be readily oxidized to indigo-blue; in fact the solution has all the appearances of a weak indigo-dyeing vat, containing indigo-white or reduced indigo. The addition of alkalies has formed the subject of several patents. The want of success, however, has been due to the fact that the indigo thus obtained was necessarily contaminated with the precipitated lime and magnesium carbonates. In order to obviate this difficulty, B. Coventry introduced his system of using an intermediate vat, which retains the precipitated matter. If the liquid to be treated is perfectly clear, the precipitate obtained on the addition of an alkali consists almost entirely of mineral matter, but if it contains matter in suspension a considerable amount of organic matter is also removed. The indigo obtainable by Coventry's

process is of very high quality, and it usually contains a very much greater proportion of indigo-red than indigo made in the ordinary way. The formation of indigo-red always occurs when an alkali is added in slight excess to the liquid from the steeping vat. This peculiar property was discovered by Schunck as long ago as 1855. The proportion of indigo-red formed appears to be dependent upon the amount of alkali added in excess, and the length of time occurring between this addition and beating. The production of indigo-red under these conditions is very strong evidence in support of the view that the liquid obtained on steeping indigo plant does not consist of a solution of indigo-white. Indigo-white is not changed into indirubin or indigo-red by the action of alkalies.

Indigo-red is a very valuable coloring matter. It is exceedingly fast to light and milling. Even the sulphonic acid compound is very fast to light. From statements which have been published regarding the properties of artificial indirubin, it would appear that this coloring matter is not identical with natural indirubin or indigo-red. Koppeschaar states that the carmine of synthetic indirubin is readily soluble in strong salt solution, whereas that of the natural product is nearly insoluble. He also mentions that the artificial variety contains about 25 per cent. of indigotin. The dyeing properties of artificial indirubin as described in a recent paper by A. Schmidt are moreover at variance with my own experiences of natural indirubin. Unfortunately, I have not hitherto been able to procure a sample of the artificial compound.

The Indigo Trade.—The indigo crop is greatly dependent upon the weather; hence we find great variations in the exports from year to year. Notwithstanding the severe competition of coal-tar colors during the past ten or twenty years, the exports of indigo from India have not materially changed. It is true that for many styles of dyeing, coal-tar colors have largely replaced indigo, but the amount thus replaced appears to have been compensated by the opening up of new channels or by the general increase in the trade of the textile industries throughout the world. Probably the consumption of indigo has been most affected by the introduction of acid colors, which have to such a great extent superseded extract of indigo. As all dyers are aware, indigo extract is altogether different to indigo itself. It is the sulphonic acid compound of indigo, and unlike the original coloring matter is neither fast to light nor milling. It would be out of place in this paper to discuss the methods of dyeing with indigo and the properties of the dyed color. Indigo dyeing is a specialty and descriptions of the processes involved can only be looked upon as indicating the principles of the art. A thorough knowledge of dyeing with indigo can only be gained by a long apprenticeship in the dyehouse.

Although indigo has been cultivated in India for many centuries, the amount imported from the whole of Asia into Great Britain in 1782 was only 25,500 lbs. In the same year the States of America and the West Indies furnished 225,500 lbs. The total imports amounting to 495,000 lbs. From that year the imports steadily increased; in 1795 they amounted to 4,368,000 lbs. of which Bengal alone furnished 2,955,000 lbs. In 1815 the indigo exported from Bengal amounted to 7,650,000 lbs., or rather more than 3500 tons.

According to the Board of Trade returns, the value of the indigo imported into Great Britain far exceeds that of all the aniline and alizarine colors of every description.

Northern Behar, which comprises the district of Tirhoot, Chumparan, and Chuprah, furnishes about two-fifths of the total amount of indigo produced in India. From 300,000 to 400,000 acres of land are devoted to the cultivation of the plant, and some million and a half of people are employed in the industry. The capital there invested is about $25,000,000.

Wool Prices and German Manufactures.

The rise of prices in the wool market begins to cause general anxiety in Germany. Many manufacturers there find difficulty in executing their spring orders, because the wholesale houses will not give the advanced prices demanded by the manufacturers. The latter have not even based their calculations on the prices ruling at the September London wool sales. The wholesale dealers are of the opinion that they can not command or pay higher prices for qualities which they have been running for years, while manufacturers can no longer deliver at the old rates. Sales can be effected only on the basis of the new quotations. The wholesale houses believe that the prices of wools will go still higher, or in any event not retrograde from those now ruling. The consequence of this is that at present, small orders are given, and even these can be obtained only under the most exacting conditions.

Although the stock offered at the London wool auction was large, the quality was not entirely satisfactory; but the exceedingly animated tone of the market was not influenced thereby. The competition was keen, especially on the part of England, whereas the Continent, and more particularly Germany, kept in the background. There soon arose an increase on July values of 10 per cent. for Australia merinos, and this was most noticeable in the good middle qualities. Crossbreds consisted mostly of pelt wools; the fine qualities, under strong competition, rose from 10 to 15 per cent., whereas coarse and low-class qualities only advanced 7½ to 10 per cent. at the outside. Cape wools, of which the assortment was both small and inferior in quality, also showed a rise of 10 per cent. Nearly all greased and scoured wools were taken by England.

During the year 1898, the rise in prices of wool was 7½ to 10 per cent.; at the January wool auction, 1899, the rise was 5 to 7½ per cent.; at the March auction, 7½ to 10 per cent.; at the May auction, 20 to 25 per cent.; at the July auction, 5 to 7½ per cent.; at the September auction, 10 to 15 per cent. So that the rise in prices as against 1898 runs from 55 to 75 per cent.

The cause of this rise in prices lies in the reduced shearings. Whereas 1,582,719 bales were sent from Australia in 1895, she only delivered 1,266,224 bales in 1899, in spite of the fact that the demand has constantly increased and the consumption grown much larger.

Germany and Protection.

There is no humor like unconscious humor. There is as big a bit of this kind in the German papers of this afternoon as I ever came across. A big fellow in Cologne or contiguous to that city of sweet smells is out in a letter the like of which for what I call ghastly, unconscious humor, Chesterfield never dreamed. In a word the thing is this. Out of the goodness of their kind hearts the managers of the Philadelphia Exposition asked one Secret-Commercial-Counsellor van den Zypen to come over and see the show. His answer is equal to anything that Mark Twain ever penned, and the amusing part is that Zypen and his people, the Germans, take it seriously, finding nothing to laugh at. What he says, roughly translated, is as follows: "Sir: You have shown me the honor to invite me to be present at a congress to be held in Philadelphia on the 10th of October. In thanking you for this invitation I must take the opportunity to tell you that I have a very lively regret that I cannot accept, because the industrial policies of your people, alas! for considerable time, especially in recent years, have been so opposed in principle to reciprocity and to what is fair, that it is impossible for me to attend. Our German industries feel very keenly the unfriendly treatment accorded through recent tariff legislation, because they are treated different to the same kinds of industries of other states. According to my opinion it is impossible under such conditions for the representatives of Germany's

economic interests to lend encouragement by their presence, to a congress of the kind you refer to in your letter of invitation. The foundation for a satisfactory active interchange of commodities between the two people is wanting, etc., etc."

This is delicious. Did man or mortal ever bump up against anything so --shall I not say silly? or must I say simply naive? It is one of the most gorgeous pieces of poppycock I ever read. And the worst of it all is that this man of many titles thinks that it is as he puts it, while it isn't. Let's be perfectly fair. If there is one thing on earth that Germans boast about it is about their desire to be perfectly fair and about their ability to treat all subjects "objectively." This is the one word of words. "Let us look at the matter objectively," i. e. coldly, dispassionately, etc., etc. Now let us do that. What are the facts? Whose tariff legislation looks the least like a fair effort to do to another as one would be done by, the German or the American? Let's see! We say right out that we put on tariffs for the purposes of protection. We don't lie about it. The world knows just why we do it. Whether the policy is wise or unwise has nothing to do with that one fact: we put on tariffs for the purpose of protecting, and they protect. How well, is not the question. They do fairly well just what they were designed to do. How is it here? What is the purpose behind the exclusion of American meats and fruits? Protection! Protection pure and simple. Not, however, as they would have the world believe the protection of the people's health. Oh, no. It is to protect the German farmers. Now that in itself is all right. No American is fool enough to find fault with any people who go in for protection. It's not the protection that Americans object to, it's the mask under which it makes its appearance.

In 1895, this continent took some 56,000 barrels of American apples, in 1896, encouraged by the splendid work of Consul-General Mason, then at Frankfort, Consul Monaghan at Chemnitz, who, it will be remembered, went over to the United States to carry out his own and Mr. Mason's plans. The States sold, on this side, that year, 1,200,000 barrels. The year after, fearing a like importation, the German horticulturalists found the famous or infamous scale louse on American apples. They find (?) trichinae (?) in American meats; paper soles (?) in American made shoes; iron where steel ought to be in American bicycles, etc. The fact is you can find anything you look for, if you only know just when and where to look. It isn't hard. It requires only a little foresight.

Look a little where you don't expect to find any and a good deal where you do. Now I know that American apples are good, that they are the best in the world. I know that German are bad, bad as it is possible for them to be. I have seen much better apples fed to hogs in the United States than I ever saw in these markets. I know that we have the best shoes on earth, for the price. I never saw paper soled shoes in America, but I saw such here, the other day. They were at the United States consulate and are to be sent over. We have the cheapest meats in the world. Here meats are so high that the working people cannot reach them only on very rare occasions. The so-called middle classes here eat less meat and luxuries than do our so-called working classes. Why! Because it's too dear.

BROWN.

Chemnitz, Germany.

—The New York Cotton Exchange gives the estimate of 150 members for the present cotton crop at 9,613,000 bales.

—Suint is that portion of the wool impurities which is removed by solution in water.

—Loose wool, previous to being scoured, is greasy, being impregnated with yolk.

The Cotton Industry in Russia.

An English cotton mill man, who has worked in Russian cotton factories, writes to one of his home papers to the effect that slackness of trade is a thing seldom, if ever, known, and when any part of the machinery is stopped it is nearly always because it is waiting for materials from some of the other machines, and not because the masters are short of orders. Within the past few years the speed of the machinery in the cotton mills has been greatly increased. At a certain mill belonging to a Russian nobleman, the speed of the first looms taken over to Russia was 120 picks per minute, and now the same looms have been increased in speed to 200 picks, and the operatives run from three to five looms, whereas when mills were first erected two looms were considered quite sufficient, and many weavers used to have only one loom.

The laws relating to the cotton mills are very few, but what laws do exist are rigidly enforced both in regard to the employer and the employed. There are a few factory inspectors, and these pay the mills a visit about once in six months. In many cases the inspectors not only punish the employers for breaches of the law but also the operative, the inspectors having the powers of a magistrate. In one instance the overlooker was told he was wanted in the office, and on arriving there he was addressed by one of the inspectors in English, who, after asking him a great many questions, told him he had paid a visit to England to inquire into the conditions of factory life in Lancashire, and report to his Government. The inspector said there were many things in the mills in Lancashire which he could not expect to see introduced into Russia, great cleanliness being one of them. The inspector said he never in all his travels, which extended nearly over all Europe, saw a class of workpeople who attended so well to their work and paid attention to the orders of those placed in authority over them. In many cases the Russian inspector had great difficulty in finding out whether he was conversing to the master or the workman on account of the masters and the officials being dressed so much alike. In all his travels he had never seen workpeople so well dressed as in Lancashire, and during holidays the workmen kept sober, while the Russian always got drunk. The overlooker was subsequently told that the inspector was a man who possessed great abilities, and had risen from the position of a workman—a most unusual thing in Russian Government service. The writer says that about 1,000,000 cotton spindles have been put down in Russia during the past two years, and that now nearly 300,000 persons are employed in the cotton industry. Although no reports of trade appear in the newspapers, the price of yarn is nearly always the same and varies very little, this being on account of the duty, which is nearly double the price that it is in Lancashire. If a foreigner goes to Russia and it is discovered he bothers about Government matters he is soon made to feel uneasy, but leaving such things alone he has full liberty.

Oiling Fly Frame Spindles.

Paper read by Russell W. Eaton, Brunswick, Me., at the Montreal meeting of the New England Cotton Manufacturers' Association.

In presenting the subject of the oiling of fly frame spindles I attach more importance to it possibly than many other members because my experience at one time brought very forcibly to my attention one of the evils attending it. I refer to an occasion when I was called upon to locate the cause of certain stains in the goods. I do not doubt that a great many are able to fix at once on the true cause of any oil stain that may appear in the cloth. I have only to say that in this particular case the cause had not been found. The particular stain to which I refer was in the filling. I adopted the rough

method of ascribing the trouble to the weave room and insisting that the overseer should stop it and should do so promptly. This brought from the overseer of weaving several cops with stains in them. Going to the overseer of mule spinning, and now reinforced by the stained cops as evidence of guilt I made the same demand upon him. This brought from him the roving which was the cause of the trouble. We were now getting nearer. I had located the particular card room which was doing the mischief. I will say that I was sincere in my first attempt to lay the blame on the weave room as I had supposed that the stain was produced in an old steam box from the dripping. Having at last driven the trouble back to the carding department I went over the matter with the overseer and finally the trouble was located. The intermediate bobbins were very old—were all cracked and all oil soaked. I found that the oil worked through the cracks and stained the first layer of roving where it touched the bobbin. This was not noticed. In fact it could not be as the stained part was always concealed. Throwing out nearly all the bobbins and putting new ones in their places was the next thing, and the oil stains were reduced until from five bales weekly of oil-stained goods, they entirely disappeared.

Not long ago a bobbin maker told me of a complaint that came to him of yarn being stained by oil from filling bobbins which he had just furnished a mill, and an examination of the work showed the trouble to be in the cracked bobbins in the card room. The occurrence which I have narrated above led me to take considerable interest in the subject of oiling fly frame spindles. I find several builders have self oiling or magazine steps for the spindles. All forms require oil to be put on the spindle and on the bobbin gear. These parts must be oiled of course and in all cases oil is likely to fly out on to the rest of the machine and the bobbins are sure to get more or less oil in them. There is, however, a method which seems to do away with this trouble. The oil is in a magazine in the bolster tube and oils the spindle near the top of the tube. An opening filled with a fibrous substance also allows oil to pass to the bobbin gear. In addition to this all the bolsters are connected by tubes and then with a central oil receptacle. In this way all the spindles and all the bobbin gears in a roving frame can be oiled from one point, namely, a receptacle located near the centre of the machine.

Cotton Goods in West Africa.

The United States representative at Sierra Leone, on the coast of West Africa, writes to the Department of State, that there is a promising opening there for American cotton goods, and believes that there should be increased efforts made to secure a trade fitting in these tropical countries, as more cotton fabrics are used as clothing there than any other kind of goods. European manufacturers are showing much activity in securing and controlling this trade, and appear to be satisfied for the time being with securing trade advantages for the future, rather than to secure enormous profits at the present.

As the Africans are brought more into contact with European habits and customs of civilization, they become larger consumers of goods of this kind. Great quantities of prints, sheetings, shirtings, etc., are daily transported to the interior towns and villages by native carriers, by canoes and sailing craft of every kind. These goods are largely imported from England, France and Germany, whose manufacturers cater to native fancy and taste in certain lines of goods. In addition, the representatives of these firms have the advantage of long acquaintance with the African and have made local business arrangements that please the natives, employing them in the capacity of clerks, bookkeepers, etc., and thus keeping their goods constantly before the mass of native dealers.

The African, as a rule, is proud; he despises rags and places a premium upon good material. The native merchants, besides being shrewd traders, are excellent judges of dry goods—especially of the durability of fabrics of any kind. Being familiar with climatic conditions, they know what suits their trade, and that only will they buy. The low price of an article, if it is not suited to their taste, is no inducement to buy. It is simply what is wanted that sells. Nothing but the best goods for the cheapest money value should be sent here. Coarse cotton fabrics would not sell well; checks, ginghams, unbleached domestics, etc., are considered too common; on the other hand, satins, prints, muslins, madras, karkis, sheetings and shirtings, and various other classes of cotton goods, would be popular if of good finish and attractive colors—any modification of blue and white or blue and black in prints or satins would please.

With the growth of American trade in competition with that of other nations, our manufacturers are advised to pay more attention to making goods for export according to the requirements of the trade sought. Attention given to these details, together with our extensive facilities for superior work, should enable us to win.

The traditions of the African race should not be ignored in manufacturing for this market; for example, certain animals, trees, plants, vines, and even seashells are held in great respect by the natives, having been worshiped by their ancestors. The present generation does not forget these traditions, though many are educated and enjoy the advantages of civilization.

It is by observing these points that the European exporters have gained such footing in African trade. No doubt, in many instances their goods are inferior to our own in durability—starch taking the place of body—yet they sell because African and not European ideas are respected in the design and manufacture of the goods.

Credit would not be a great inducement except to European houses, as the terms of trade, at Sierra Leone, for instance, are generally cash. There is now a spirit of keen mercantile rivalry among the nations seeking this African trade, but there is encouragement for American dealers to compete, if they will make the necessary efforts along the lines suggested. There are no discriminating tariffs, no restrictive legislation with which to contend. Aside from the 10 per cent. ad valorem duty, this is practically an open field, and with more energy on the part of our exporters of cotton goods, their products can find a good market in West Africa.

Agreement Among Knit Goods Manufacturers.

A meeting of underwear manufacturers was held at Albany, N. Y., last month. Great secrecy was observed concerning the transactions and discussions that were had at this meeting, and the only information that was intended to be given out was that in the form of communications from various manufacturers to their selling agents. It was understood that a general agreement was reached, fixing the prices on the more important grades of fleece underwear, as follows: the $3.25 grade was advanced to $3.75, for plain goods; the $3.50 grade was advanced to $4.00; and the $3.75 woolback grade was advanced to $4.50. These prices were previously agreed upon, at a former meeting, but many of the manufacturers in the trade did not observe the schedule. The impression in the trade, however, is that the advance in price will prove too great and cannot be realized. It is further stated that some of the manufacturers are not disposed to continue their allegiance to the agreement. Changes were also proposed for dating and discounting sales, and instead of November 1st being charged on orders, with eight per cent. anticipation, dating will be October 1st, with six per cent. anticipation. These agreements are not fully assured yet.

German Textile Factories in the United States.

German papers discuss and copiously comment on the late news that the firm of Bruhm's Soeline, of Gera, one of the largest textile-manufacturing concerns in Germany, is now about to establish a factory and branch house in the United States. One of this firm's partners, Henry Bruhm, has been in the United States for some time past to carry out this purpose.

The United States consul at Frankfort, Germany, writes to the State Department that it is confidently expected that this enterprise will be as successful as those of the firms of Stohr & Co. (worsted-yarn spinners), which recently established a branch factory in Passaic, N. J.; Georg Hirsch, of Gera; and Arnold of Greiz, which also have factories at Passaic. (We know of no such enterprises.—Ed. T. W.) These German ventures in the United States are said to have been very profitable. A report is now current that manufacturers of Gera have formed a syndicate aiming at the erection of new worsted-textile factories in the United States. News also comes from Rhenish Prussia (the Crefeld and Barmen textile-manufacturing district) that manufacturers of silk and woolen textiles there purpose to erect branch factories in the United States.

The straits in which this German industry has been placed by the partial shutting off of the important American market, owing to the working of the tariff, has necessitated this new departure.

For our country, this move is of much greater importance than appears on the surface. It not only means new capital and skilled labor, whereby the country's population and the national wealth is increased, but it strengthens our capacity to compete in the world markets with the very country from which this skill and monetary force has been drawn. This truth is better known and more keenly felt by German manufacturing circles and their organs of the press than by our own people. This transfer of manufacturing and financial power is the handwriting on the wall telling of the coming decline of European nations as purveyors for the outside world, and the rise of the vigorous and ingenious nation of the Western Hemisphere to succeed them.

Calico-Printing Trade Combination.

The long-discussed combination of firms engaged in the calico-printing trade of Lancashire and Scotland has been accomplished. It embraces the majority of the firms in both districts, and the capital will probably reach the enormous sum of between $34,065,500 to $48,665,000. It is understood that stocks and valuations were taken at the end of September, and that all the firms concerned have accepted the valuations. For a long time, the calico-printing industry has not joined in the general prosperity of the trade, owing to competition and the cutting of prices, and it is believed the combination will exercise a beneficial influence on the market.

—A German cotton spinners' trust has been formed by Rhenish, Westphalian, Saxon and Silesian firms, comprising ninety-five per cent. of the cotton spinning establishments of the empire. The Association of Cotton Yarn Consumers has issued a circular complaining that the trust's terms are such that henceforth the foreign spinner will be able to get German yarns 15 per cent. cheaper than they can be got by Germans.

In spite of the wars and consequent general excitement and heavy taxation, native industries in Spain appear not to have suffered so greatly as it was feared they would do. The loss of the colonial markets on which the export trade of Spain greatly depended has made it necessary for the Government to take serious steps for finding new markets for Spanish products and for stimulating and enlarging those already known.

COTTON DEPARTMENT.

Types of Woven Fabrics.

THEIR CHARACTERISTIC FEATURES, CONSTRUCTION, AND MANUFACTURE.

HARRY NESBIT.

(Copyright.)

All woven fabrics are characterized by one common feature, namely, the interlacing of two or more systems of threads at right angles to each other, and in such a manner as to form a perfect and substantial texture or cloth. This may be regarded as the chief and essential principle of fabric structure. The particular manner of combining those threads constitutes a minor principle that becomes the distinctive feature of the class of fabrics embodying it.

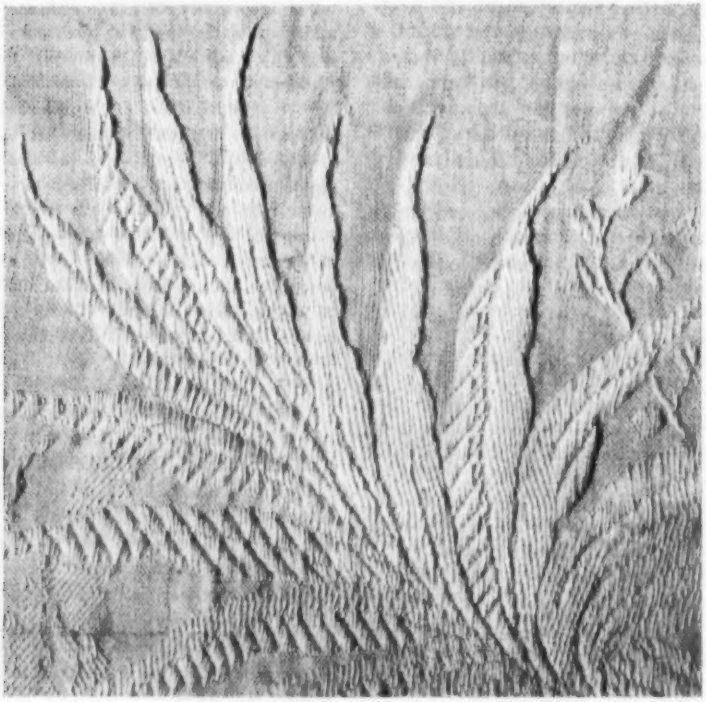


FIG. 1.

It is the diversity of the manners in which warp and weft may be interlaced that gives rise to an almost infinite variety of fabrics, an exact classification of which would be an extremely difficult, if not an impossible, task. This difficulty is greater from the fact that many fabrics are each known by several names, not only in different parts of the same country, but even in a single district. Under these circumstances, the value of such a classification would be nullified inasmuch as it could not be made of general application: otherwise, it would greatly facilitate reference by employing a definite term for a definite make of cloth. All these varieties may, however, be classified under comparatively few heads, each representing a distinct type, and all

known by names of more or less universal adoption. Each type is characterized by some specific feature that distinguishes it from other fabrics, and specially adapts it for certain uses. It is with the characteristics of types and their chief varieties or modifications that the writer purposes to treat of in this series.

After describing the leading features of the type of fabric under notice, the method of preparing designs for it, and the more important considerations to be observed in that connection, will be dealt with; and information relating to its production in the loom will be given, with such observations as are likely to be of value to those concerned.

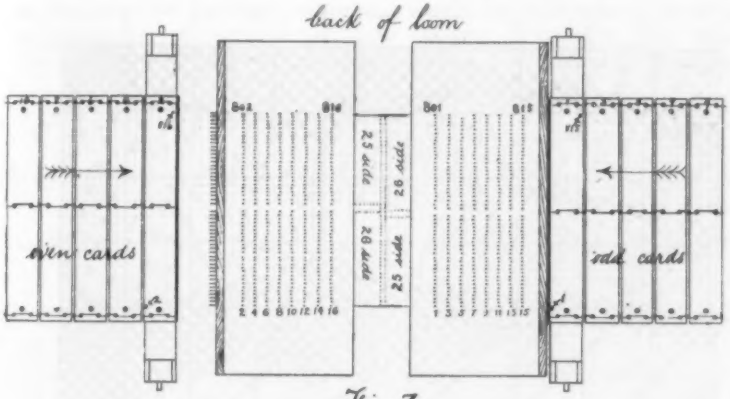


Fig. 3

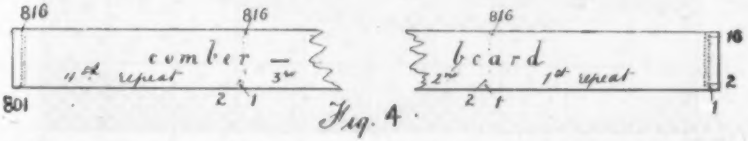


Fig. 4.

Brocade Fabrics: The term "brocade" was originally applied to fabrics generally composed of silk, and having a satin ground, upon which were "broched" or embroidered raised figures of silver or gold thread; and later, to all fabrics composed wholly of silk, having a raised pattern. At the present time, the term "brocade" is generally used to signify light figured textures made from one warp and one weft, irrespective of material, and especially those having a ground weave of calico or plain cloth from which rises a more or less bold figure of either warp or weft, or both, floating somewhat loosely.

In consequence of the great difference in firmness of texture that usually exists between the ground weave and figure portion of a brocade fabric, the figure is liable to be somewhat weak and flimsy. This danger is greatest when a ground weave of plain cloth,—the firmest and most compact of all weaves,—is employed. By reason of the threads being loosely interwoven in the figure portion, they crowd together; whereas in the ground portion they are so compacted that they tend to open out and encroach upon the figure where they have more room. This tendency of threads to leave their proper place is greater with weft, as this is being constantly acted upon by the reed, than with warp, as that is held taut during weaving. The result is, that the former system of threads, instead of lying in a perfectly straight line across the cloth, assume a decidedly wavy appearance, and cause thin open places near the edges of the figure, especially

the upper edges, as the cloth lies in the loom.

These defects are shown in Fig. 1 which is a photograph taken of a piece of gray brocade cotton cloth of average quality as it left the loom. It has a plain ground weave with an all-weft figure, and is made with 76 ends per inch of ordinary 30's T, two ends in each dent of the reed, and 98 picks per inch of 20's soft weft.

Although the defects before described are inherent with brocade fabrics in general, and cannot, therefore, be entirely obviated, they may, to some extent, be minimized by exercising care when preparing the design, and also by ensuring a proper ratio between counts of material and threads per inch, according to the particular ground weave employed. As the ground portion should form the firmest part of the fabric, this must be taken as a basis by which to determine the particulars named above. A firm and well balanced ground should be obtained, otherwise the whole fabric will be faulty. If the yarn is too coarse, or there are too many threads per inch, the ground will be harsh and boardy, and will tend to wrinkle. On the other hand, if the opposite conditions obtain, the whole fabric, and especially the figured portion, will be flimsy and weak.

Almost any kind of design may be worked in this type of fabric, but those having fulness of figure give the best result. Unless the cloth is very fine, and of good quality, any small detail of pattern would be lost. The pattern

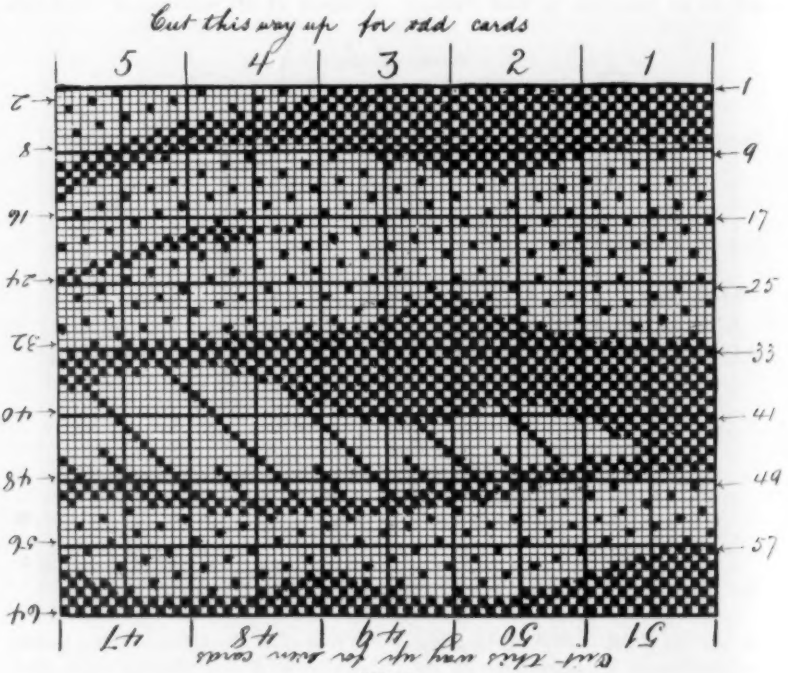


FIG. 2.

should not consist of heavy masses of figure, but should be evenly disposed over the whole surface. This is apart from any artistic effect, and with a view to causing all warp threads to bear an equal strain. If the design is of a decidedly stripy character, with the stripes running in the direction of the warp, the warp ends weaving the ground stripe will have to bear the greatest strain during weaving; and when the cloth is cut out of the loom it will tend to wrinkle in those places, through contraction, on being relieved of such strain.

As previously stated, a brocade figure may be developed in all-warp, all-weft, or both warp and weft. The latter course offers much more scope to the designer in obtaining greater variety of effects, especially where warp and weft are of different color. Also, the character of yarn must not be very different between warp and weft; otherwise, figures developed from the inferior material would suffer by comparison with those of the better material, thereby giving to the whole piece an inferior tone.

Designs of large dimensions requiring the use of two jacquard machines, are generally made with all-weft figures, and developed on what is known as the "tabby" (plain cloth) principle, i. e., odd-numbered warp ends only are lifted on alternate picks, and even numbered warp ends only on the other picks. This is accomplished by controlling all odd warp ends by one machine, and all even ends by the other machine, and operating the machines alternately on consecutive picks. Also, the jacquard cards are laced in two sets, one odd and the other even. One machine, therefore, takes all odd cards, and the other machine, all even cards. A harness tied up in this manner is termed a "split tie-up," and, although its adoption imposes certain restrictions upon the designer, as will be seen presently, it offers many advantages to the manufacturer in the economical production of these fabrics; which advantages may be enumerated as follow:—

(1.) As only one machine is raised for each pick, only one half the number of cards are required, as compared with the number that would be required if each machine commanded only half way across the pattern, instead of the entire width for then both machines would have to lift for each pick. Half the cost of cards, card-cutting, lacing, and wiring, is therefore saved. (2.) By operating the machines alternately, they may be regarded as constituting a double-acting machine. Production may, therefore, be increased by employing a quick-running loom; and the machines work better, and last longer. (3.) As each machine commands the entire width of pattern, they will both perform an exactly similar amount of work in shedding, one will not be subjected at any time to greater strain than the other, which is liable to occur if the machines control separate halves of the pattern, or if one machine were employed to weave the borders, and the other the middle portion of the fabric. It will be seen, however, that with a "split tie-up," it is only possible to weave designs with either all-weft or else all-warp figures, the latter being woven wrong side up; and, in consequence of figures ending abruptly against a ground weave of plain cloth, they have

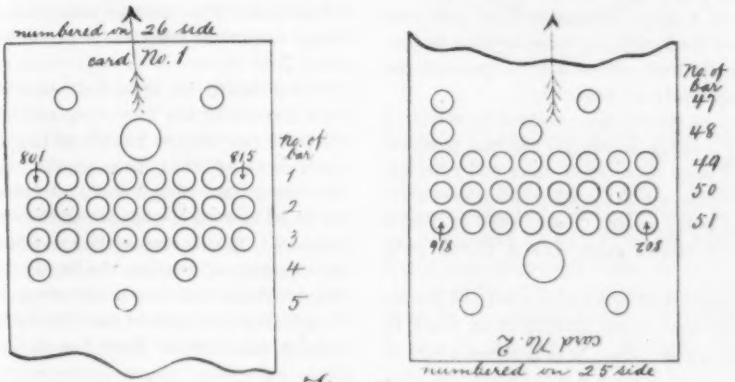


Fig 5

very broken and ragged edges, especially in the coarser makes of cloth. The designer is also restricted in his choice of effects when developing a design, as he can only employ such weaves, either for a ground or for binding the figure, that require odd ends lifting on alternate picks, and even ones on the others; for it is impossible to lift two or more contiguous ends on any single pick although they may be left down en masse.

Fig. 2 is a portion of a design taken from the piece of cloth represented in Fig. 1, showing the method of preparing brocade designs for a "split tie-up." After the figures are sketched on point paper it is only necessary to edge them with a single dotted outline, and then bind them with suitable weaves to give the desired effects and to prevent too long floats of weft.

Care should be exercised in selecting the weaves, to employ for this purpose, and only those used, that will give due prominence to the figures without leaving them weak. Those used in Fig. 2 are a 10-end satin, and a 12-end twill weave.

Fabrics of fine texture may be bound with more open weaves than those of coarser texture. It is not necessary to fill in the ground portion with the plain weave, as shown in Fig. 2, but it may be indicated by a thin wash of green or yellow paint so as to distinguish it from the figured portion, and to show the card-cutter which portion he must cut.

The operation of cutting cards from a design to be woven with a "split tie-up" is very simple. It only differs from the ordinary method in that two bars on design paper are read as one; and alternate hooks read as though they were consecutive, because consecutive hooks in the jacquard machines govern alternate warp ends. A plain weave in the design is, therefore, represented solidly on the cards. This will be clearly understood by reference to Figs. 3, 4, and 5.

Fig. 3 is a plan of two ordinary 400's (408 hooks each) jacquard machines placed back to back and harnessed with a "straight-through" "split tie-up" on 816 hooks. The right-hand machine governs all odd warp ends, and takes odd-numbered cards, and the left-hand machine governs all even warp ends, and takes even-numbered cards. The hooks in each machine are numbered alternately according to the number of the end in the pattern operated by them. All mounting threads passing through holes in comber-board, numbered 1 (Fig. 4), are harnessed to hook number 1 in the right-hand, or odd, machine; and all mounting threads passing through holes numbered 2, are harnessed to hook number 2 in the left-hand, or even, machine, and so on up to the 816th hook. This arrangement will be found to put the least twist in the harness.

Now, it will be seen that the first hook governing the first warp end is in the back row on the 25-side of the odd machine, and that the second hook governing the second warp end is in the front row on the 26-side of the even machine. This circumstance affects the manner of cutting the cards, for, when cutting odd-numbered ones, the design must be fixed in the piano card-cutting machine so that the vertical space on design paper corresponding with the first end in the pattern, will be on the extreme left, or 25-side, and, therefore, cut last; and when cutting even-numbered ones, the design must be turned over, so that the vertical space corresponding with the second end, will be on the right, or 26-side, and cut first. This will be easily comprehended by a parallel reference to Figs. 2 and 5.

Fig. 5 shows a piece each of the first and second cards cut from the portion of design Fig. 2. Card No. 1 corresponds with the top horizontal space on the design, and card No. 2, with the one immediately below. The arrows indicate the direction in which they enter the piano card-cutting machine.

Odd cards should be numbered on the 26-side, and laced forward, i. e., 1, 3, 5, 7, etc., and even cards numbered on the 25-side, and laced backwards, i.

e., 8, 6, 4, 2. This will cause the numbers of both sets to be on the same side when in the loom, which will be found to be most convenient for the weaver.

23190 * appl. 11.98.

American Cotton Spinning Machinery.

ARTICLE XII.

CHARLES CLIFTON HEDRICK.

(Copyright.)

It is usually necessary to burnish the wire teeth of the card clothing, after the card is first ground, to remove the burs and rough edges, which are sometimes formed upon the teeth, particularly when they are overground. Burnishing is also resorted to when the teeth become rusty. Unless this is done, the sliver will show streaks of cloudy and uncarded cotton.

The burnishing is done by a revolving wire-toothed brush, which is mounted in suitable bearings, its teeth penetrating from 1/32 to 1/16 of an inch below the points of the card teeth. The brush is usually about seven inches in diameter over the points of the teeth and is shown in end elevation in Figure 84. It consists of a wooden roll, wound with straight wire fillet, number 32 wire being used with about 6½ noggs per inch. The wires are about ⅞ of an inch high, above the crown, and stand radially from the centre of the roll.

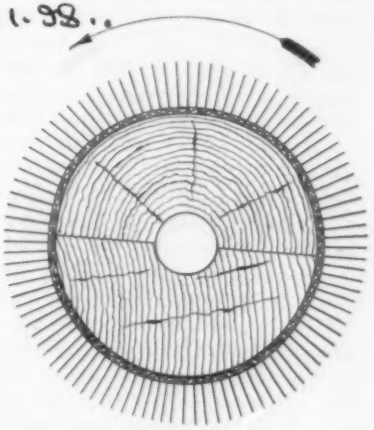


FIG. 84.

An elevation of the card, with the burnishing brushes in position, is shown in Figure 85. The cylinder and doffer are burnished at the same time. The device for driving the various parts, although very simple, requires some explanation. The brushes D D are supported at either end by stands which are adjusted from the arches of the cylinder and doffer. Upon the ends of the brush shafts are pulleys E and E. In place of the usual barrow bar pulley is a grooved pulley H, the face of which has grooves for the bands B, M and N.

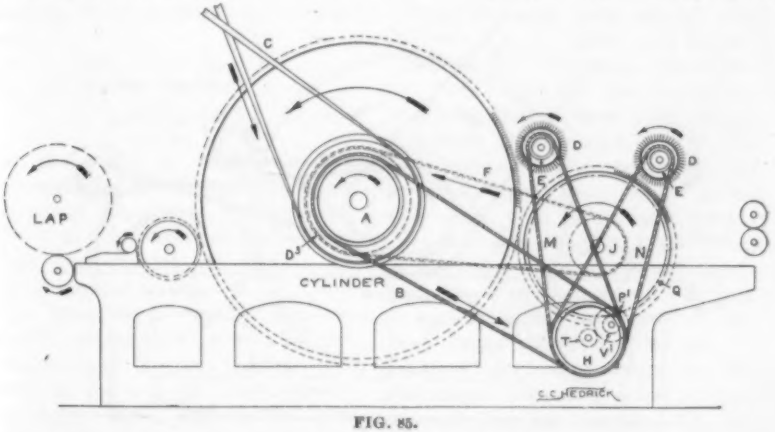


FIG. 85.

In the face of the loose pulley A, on the end of the cylinder shaft, is a

groove which carries the band B for driving the pulley H, while the burnishing brushes are driven from H by the bands M and N. The doffer is

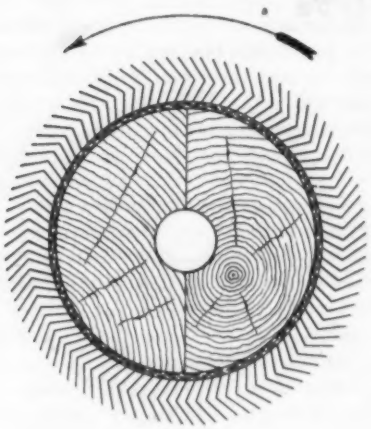


FIG. 86.

also driven from the pulley H by the gears T, P^1, V^1 and Q, the last being upon the doffer shaft. On the opposite end of the doffer, and shown by dotted lines, is a pulley J, by which the cylinder is driven through the belt F and pulley D^1. It will thus be seen, that, as motion is transmitted to all parts of the machine through the band B, it must be kept reasonably tight.

ing and grinding. This may seem, at a glance, to be unnecessary, as the band B can be crossed to give the proper direction to the cylinder and doffer, for, should the belt by any cause be moved onto the tight pulley, no accident could happen to the teeth of the cylinder, as it would be turning the same direction as the loose pulley; but, with the loose pulley turning in the opposite direction, considerable damage might be done to the cylinder clothing if the belt should slip on to the tight pulley.

Under ordinary conditions, the card requires to be stripped twice each day. For waste and very short and dirty cotton, it should be done four times a day.

The operation consists in removing the dirt and short fibres, which become lodged in the wires of the cylinder and doffer, while the card is at work. The stripping brush, shown in end elevation in Figure 86, is of about the same size and general appearance as the burnisher brush, with the exception that the wires, instead of being straight, are bent similarly to the card clothing teeth.

Figure 87 shows the card in elevation, with the stripping brush mounted in the stands in position for clean-

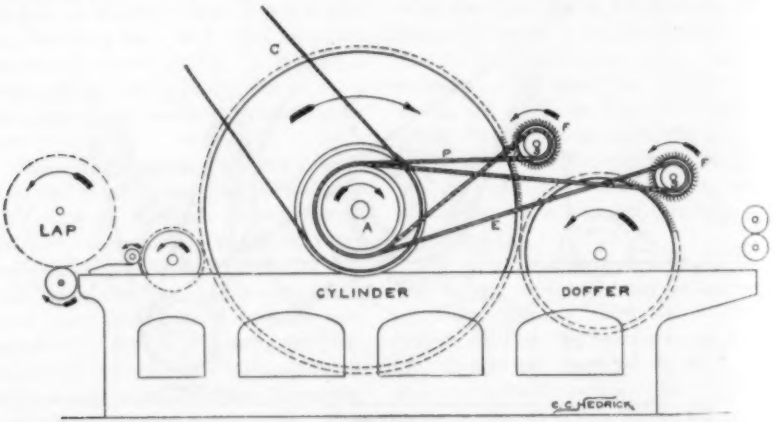


FIG. 87

The main belt C is run on the loose pulley A, which should be caused to turn, backwards, or in the same direction as the cylinder, when burnishing the cylinder and doffer. It is set so that its wires penetrate about ⅛ of an inch into the card teeth and is driven from a groove in the loose pul-

ley A by a band P and pulley S.

The main belt C is run on to the tight pulley just far enough to turn the cylinder around very slowly, one revolution is sufficient. It will be seen that the surfaces of the cylinder and brush, which are in contact, turn in the same direction, but, as the brush runs at a much greater speed, the dirt is very easily removed. The band is then taken off and the brush is placed in position for stripping the doffer, being driven by a similar band E in the same manner as with the cylinder. Previous to stripping the doffer, the driving belt is moved on to the tight pulley and allowed to remain while the brush is being placed in position and is then moved back on to the loose pulley for driving the brush. The barrow bar, which has remained down, is now thrown into gear and the doffer is allowed to make one revolution, and is driven through the regular gearing from the momentum, acquired by the cylinder, while the belt was on the tight pulley. It will be seen that the surface of the doffer runs in the opposite direction from the brush, but the wires of each are bent at such an angle that the work is easily accomplished. After the card is stripped, the brush itself needs cleaning, which is done by a hand card.

Cotton Combing.

ARTICLE VI.

As the action of the comber has been explained in detail as regards its mechanical movements we will now proceed to give directions for setting, timing and putting the comber in proper running order. It is these things upon which depends the successful working and product of the machine, and unless carefully attended to we will get waste, cloudy and twitty sliver, also needles torn from the cylinder. The timing is done on the index wheel, which has already been spoken of.

Rule 1. Turn the cylinder shaft around until No. 5 on index wheel comes under the pointer. Then set the front edge of the fluted segment from the steel detaching roller with 1⅛-inch gauge and tighten cylinders on shaft.

Rule 2. Set the flutes of the bottom feed roll from the flutes of steel detaching roller with 1 15/16 inch gauge for long stapled cotton, as Egyptian and Sea Island (1¼ inch and over), and 1 13/16 inch gauge for cotton less than 1¼ inch in length.

Rule 3. Set the cushion plate to the nipper so that it does not quite touch; then place narrow strips of paper between them at each end. Press the nipper up firmly against the cushion plate and see that the paper does not pull out. This sets the nipper and cushion plate parallel.

Rule 4. Set the edge of the cushion plate from the steel detaching roller with a 1¼-inch gauge for Egyptian and Sea Island cotton (1¼ inch and over), and 1 3/16 inch gauge for cotton less than 1¼ inch in length.

Rule 5. Set nipper to fluted segment with a No. 20 gauge. Open right-hand nipper and stop screw so as to admit a ¼-inch ladder gauge, then drop nipper to segment by turning the right-hand nipper stand screw. Proceed the same with the left side and then test both sides with paper.

Rule 6. Turn the timing dial to No. 17. Nipper cam will then be on the largest diameter, then open nipper stop screw from bracket with ¼-inch ladder gauge. Put on the springs and connecting rods and have gauge drawn out with same easy tension from each side. Try No. 20 gauge between nipper and needles, and adjust with nipper bracket screw. Do this on both front and back rows of needles. Turn timing dial to No. 4½.

Rule 7. Set timing dial to No. 6¾. Put leather detaching roller in position and drop the weights. Use No. 23 gauge between bearings of rolls and pivot blocks and see that gauge draws easily from each.

Put a strip of paper between fluted

detaching roller and fluted segment at each end and adjust lever arm so that when the dial is at No. 9½ the paper will just draw out.

COMBER.

Cotton Spinning.

Editor Textile World:

In your October number you published an article by Robert Cunleffe on cotton spinning. I read it with much interest because I am trying to get all the information I can on the working of cotton machinery. Now I think the article is an excellent one with one exception, and that is where the writer gives the reason why the bobbins do not start as soon as the spindle. He says the bobbins are driven by a cone strap while the spindles are driven by gears, and that the strap can never get into motion as soon as gears. Now this is hardly true as it all depends on what there is between the strap, and what it has to drive. But the statement that the cone strap turns the bobbins is not true, as the bobbins are turned by the same shaft as the spindles, the cone strap only turning the centre portion of the box, thus regulating the speed of the bobbins, but does not turn it. Yet the action of the cone strap tends to retard the starting of the bobbins because there are more gears to back lash, from the fixed gear on the jack shaft to the bobbins, than there are between the gear on the same shaft and the spindles.

J. E. O.

An American Machine Shop at Paris.

There was shipped from East Berlin, Conn., last month, a train load, comprising about twenty-seven cars, of structural material from the works of the Berlin Iron Bridge Company, consigned to the United States commission at Paris, France, for the steel framework of a machine shop to be used exclusively by the American exhibitors of iron and wood-working machinery at the Paris Exposition.

About a year ago a large number of American exhibitors of iron and wood-working machinery desired to show their various tools in practical operation. No provision had been made by the authorities of the Exposition for an exhibit of this kind and the United States commission decided that the only solution of the problem was to provide a separate building, and equip it with motive power, in order that American exhibitors might show their machinery at practical work, and at the same time make an exhibit of a typical American machine shop, with all modern appliances, including traveling crane, hangers, shafting, electric motors, etc. With this end in view the Berlin Iron Bridge Company, because of its large experience in designing and building this class of construction not only throughout the United States, but also in foreign countries, was chosen to design and set up this building.

The building will be 343 feet long and 77 feet wide. It will be constructed of American products and fabricated entirely in this country, shipped on a United States transport, erected by American mechanics who will go to Paris and put up the building in place complete, ready for exhibition. This structure, from foundation to spire, including all the machinery, equipment and everything within the walls, will be an American exhibit manufactured by Americans, showing American machinery in practical operation.

—Various machines have been introduced to facilitate the scouring of woolen yarns and to dispense, as much as is possible, with manual labor. These machines may roughly be classified into two kinds, those that only partially supplant hand work and those that treat the yarn in a continuous manner.

—The soda ash acts upon fatty acids and the cholestearin in wool is removed by emulsification with the soapy liquid.

WOOLEN DEPARTMENT.

The Science and Practice of the Construction of Woven Textures.

FRED BRADBURY.

(Continued from November.)

A sectional elevation is supplied at Fig 59 showing the essential parts of the mechanism employed on Hutchinson & Hollingworth's American Loom. This motion may be taken as a thoroughly representative type of the semi-positive "let-off" motions. A description of these several elements including the movements of them, is as follows.

The parts of the mechanism as seen in the illustration are principally supported by suitable bearings to the inside of the loom framing. The view of the elevation is from the inside of the loom. A is a simple lever of the first order having a long and short arm and free to move about the stud S, which is securely fastened to the loom end. B is a bell crank lever and free to move upon the stud T, which is also fastened to the loom framing. The almost vertical arm of this lever is recessed so as to support a steel beam C, over which the warp passes from the warp beams to the healds and cloth. The straight arm of this lever B supports an adjustable connecting rod D and also a regulating screw R; the vertical straight rod D connects the lever B with the arm P, the latter being the weight lever which has its fulcrum at the point O. It will be observed the lever P belongs to the second system of levers, since the resistance overcome lies between the fulcrum and the force applied at W. The rod E, which is connected to the bell crank lever I, is free to move in a vertical direction, being controlled by a guide, not shown in the illustration, at the back of the lever A. An adjustable collar U is fixed to the rod E just below the lever A, as shown. The bell crank lever A is supported and free to move upon the stud V, which is fastened to the loom framing. A small connecting rod K unites the lever I with the lower part of the sword of the going part lettered J. A fourth connecting rod F is suspended from the lever A at the point X. The lower end of the rod F supports a small casting Y, which contains two small pawls or pushing catches G. The casting Y is free to move upon the horizontal shaft N. Upon this same shaft a ratchet wheel H is securely fastened. The shaft N also contains at opposite ends a small brake wheel Q and a worm M, respectively, both of which are keyed and turn with the shaft. The worm M gears into a worm wheel L, which latter is securely keyed to the end of the warp beam. Such is the description of the mechanism.

The process of unwinding the warp and the action of the above several parts are as follows: The warp passes from the warp beam over the steel roller support C to the fell of the cloth, as is clearly shown in the diagramatic illustration supplied at Fig. 60, to which the reader's attention is directed, since it will materially assist in understanding the action of the above various parts. Each time the going part strikes against the fell of the cloth it causes the warp to exert a force upon the roller C, which, being fixed in the upright arm of the lever B, tends to press inwards the upright arm; but to elevate the horizontal arm the latter is regulated by the resistance of the weight W and the lever P acting through the connecting arm D. The adjustable screw R rises slightly with the horizontal arm of lever B, and thus leaves room for the short arm of lever A to rise until it is in contact with the screw R. Also when the going part goes towards the fell of the cloth, the connecting rod K pulls forward the lower arm of the lever I, and thus admits the upper arm connecting rod E with stud U to fall. The long arm of the lever A is

free to fall part of the way towards the stud U, but it cannot fall to the lowest point to which the screw U descends, because the short arm comes in contact with the screw R, and so regulates the distance which the connecting rod E with the casting Y falls on the remote side of the shaft N. Consequently the pawls G are permitted to recede ½, 1, 2, 3 or more teeth in the ratchet wheel, according as the take-up of the cloth requires. Then as the going part recedes, the strain is thus released from off the back roller C, which therefore allows the force acting through the connecting rod D upon the horizontal arm of the lever B to cause screw R to press upon the short arm of lever A, thus tending to elevate the longer arm, rod F, casting Y, and pawls G. Also at the same time, as the going part recedes, the connecting rod K pushes back the lower arm of lever I, and elevates the upper arm E and collar U, the latter of which presses against the under side of the longer arm of lever A and thus assists in raising rod E, casting Y, and pawls G. Thus ratchet wheel H, shaft N, worm M, are slowly but gradually turned upon the shaft bearings, and since the worm M gears into the worm wheel L upon the warp beam, this beam is, therefore, positively turned and unwinds the warp according to the take-up of the cloth and the pressure of the warp upon the back rest C, which for the same make of cloth should always remain constant. Consequently there is scarcely any necessity to change the weight and levers from a full warp beam to an empty one. The slight difference which exists in the weight required at the finish, compared with that at the beginning of a warp, is due entirely to the different powers of resistance which the warp possesses at different periods in the process of manufacture and in which the angles formed by the warp as it passes over the back rest C are less at the finish of a warp than at the commencement. A careful study of these factors will be found to be not only interesting, but useful, inasmuch as they illustrate a defect in the mechanism, which, when overcome, will bring it nearer perfection.

With the object of assisting the student to understand these important factors, the diagramatic illustration given at Fig. 60 has been prepared, together with the following description of the construction and explanation of the fundamental principles involved.

Construction: Select any suitable point A, then with A as centre, and radius equal to half the back rest, describe a circle to represent the back rest, over which the warp from the top beam passes; also in the same horizontal plane at a point A^1, 4 inches removed from A, describe a circle B^1, to represent the back rest over which the warp passes from the bottom warp beam to the healds and cloth. Then on the periphery of circle B at a point which may be termed the centre of the pressure of the warp on the back rest, draw a horizontal line C D, 43 units in length to any scale, to represent 43 inches, the distance which the warp is from the fell of the cloth. Further, with C as centre and radius 12 units (same scale), describe an arc of a circle E F, then in the straight line C D, at a point G 3½ units removed from C, draw a perpendicular line cutting the arc E F in the point H. This last letter represents the position where the last lap leaves the warp beam. Join C H. Then in the arc E F take a point I and describe a circle J of seven units diameter, to represent the empty warp beam, but so that its periphery is tangent with the straight line C H and passes through the point H. With the same centre I describe a circle K, 21 units, to represent the full warp beam. From the point H draw a straight line H L of equal length and parallel to C D. Join D L. Then C D L H is a parallelogram of which the straight lines C D, C H, represent respectively the direction and inversely the magnitude of resistance. Join C L. Then upon the principle of the parallelo-

gram of forces the diagonal line C L represents the magnitude of resistance of the two forces C D and C H upon the back rest B, which is acted upon by a force of weight and levers. The magnitude of resistance is therefore equal to the pressure exerted upon the back rest by the said weights and levers, otherwise the two opposing forces could not be in equilibrium or at least in an approximate state of rest.

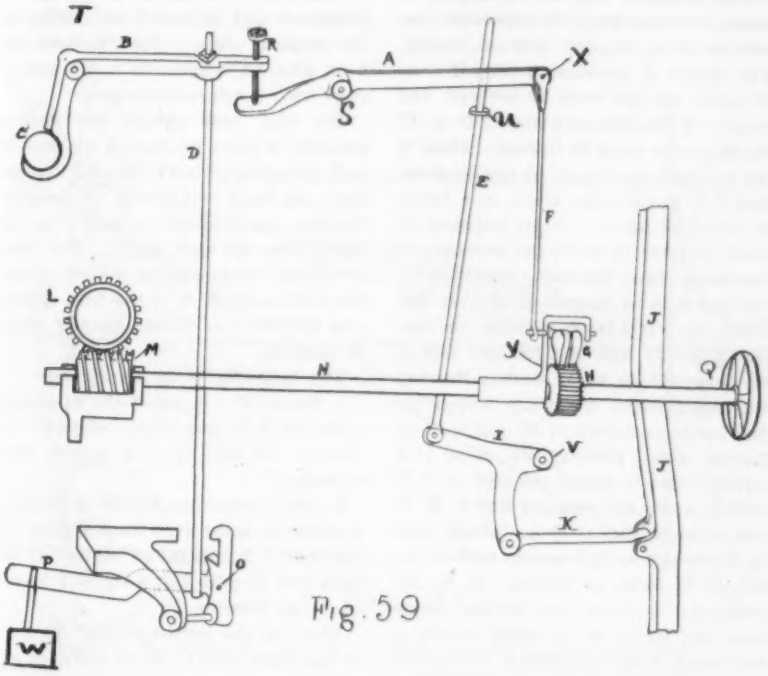


Fig. 59

It is now required to find or prove the direction and magnitude of these two forces E C and C D, together with the pressure on the point C, and the resultant force which shall graphically represent the direction and arithmetically the magnitude of the two given forces acting simultaneously upon the point C.

This, as just previously indicated, may be determined by the application of the principle of the parallelogram of forces, which latter may be defined thus:—When two forces act on a point they may be represented in magnitude and direction by two straight lines drawn to the same scale from the given point, which will then relatively represent the magnitude and direction of the two given forces. Then if a parallelogram be constructed upon these two straight lines, the resultant force will be represented in magnitude and direction by the diagonal line across the parallelogram which passes through the given point. Without any attempt to prove this elementary truth we shall apply it to the present purpose.

N. B.—A parallelogram is a four-sided figure which has its opposite sides parallel.

When the lay of the going part strikes against the fell of the cloth at point D, the warp beam is stationary, therefore tension is put upon the warp, which, acting as a medium of force, exerts a pressure upon the back rest B, at the point C, Fig. 60. It will thus be evident that the resistance of pressure of the back rest B is against two constant forces E C and C D, and

when the warp beam contains only the last lap the two forces are represented by the straight lines H C and C D.

By a reference now to the parallelogram H C D L it will be seen that the direction and magnitude of the forces are represented by the adjacent sides H C and C D and the resultant force will therefore be represented in magnitude and direction by the diagonal line C L.

The diagram, Fig. 60, is drawn to scale, it being usual to represent one unit of force by one unit of length. The length of the straight line H C = 12 units (in the loom 12 inches); the length of the straight line C D = 43 units (in the loom 43 inches). Then if we measure the length of the diagonal line C L in the same scale, it is found to equal 48 units, i. e., it requires 48 units of force to resist the pressure of the warp when the angle produced by the latter is as shown at H C L and when the warp beam contains the last lap only. If now the straight line L H be produced to or drawn through the point where the warp leaves the full beam, as shown at M, and C M be joined, whilst through the point D a straight line is drawn parallel to C M which meets the straight line L M in the point N, and C N be joined, then M C measures 11.3 units, while C D equals 43 units as before. C N, the resultant of these two forces, measures 44.3 units, or, in other words, a full warp beam requires a resistance of 44.3 units of force.

Therefore the amount of force which is required to be overcome for a full and an almost empty beam when compared is:—Full beam ÷ almost empty beam = 44.3 ÷ 48 which is about 1/12 difference in weight between the two extremes.

The results for the bottom warp beam may be obtained by the same method of construction and upon the same process of calculation.

The above, when compared with the ordinary negative system of letting-off the warp, reveals a vastly less difference in variation. In the negative system it was proved that the full beam required 7 units of force to hold as compared with 3 units for an almost empty warp beam. Hence, in the semi-positive motion it will be evident that the tension upon the warp-threads for a full and an almost empty warp-beam is comparatively small. It will also be readily understood that for any given make of cloth the weights must always be the same. Therefore, if these be once accurately determined and systematically recorded, all future warps and pieces can be weighted and adjusted according to the original tests. This method has been adopted in practice to my knowledge with much satisfaction.

We may now obtain the correct amount of force which the weights W and compound levers B and P exert upon the back rest C, Fig. 59, so as to balance the resultant pressure of the warp upon the back rest C. The lever P belongs to the second system of levers and the lever B to the first system and the weights W are usually about 20 pounds.

The following is an actual test:

1. Force of weight, W = 20 pounds adjusted 9 inches from fulcrum; resistance of rod, D = 3 inches from fulcrum O.

2. The connecting rod D is fixed to a point on lever B, 8 inches from its fulcrum T. The point of contact of the back rest B with the warp is 2 inches from the fulcrum T.

That is, the perpendicular distance of the back rest C in its point of application and in the direction of its force is 2 inches from the fulcrum T. Then if a force of 20 pounds be applied to the lever P at a point 9 inches from the fulcrum O, the product of this force and lever must equal the pressure upon the rod D acting as a resistance at a point 3 inches from the fulcrum O in the opposite direction to the force W.

Then, if we let P equal the force applied and D equal the resistance overcome,

Therefore, P 9 = D 3 = 20 × 9 = D 3. Therefore D = 20 × 9 ÷ 3 = 60 pounds, which equals the pressure upon the rod D.

Therefore the rod D exerts a force of 60 pounds upon the straight arm of the lever B at a point 8 inches from the fulcrum.

Further, the resistance overcome by the steel beam C must balance the force applied by rod D upon the straight arm of lever B.

Then if B equals the force applied, and C equals the resistance overcome, B 8 = C 2 = 60 × 8 = C 2. Therefore C = 60 × 8 ÷ 2 = 240 pounds, which equals the resistance to the pressure upon the back rest C by the warp-threads. This force is therefore the

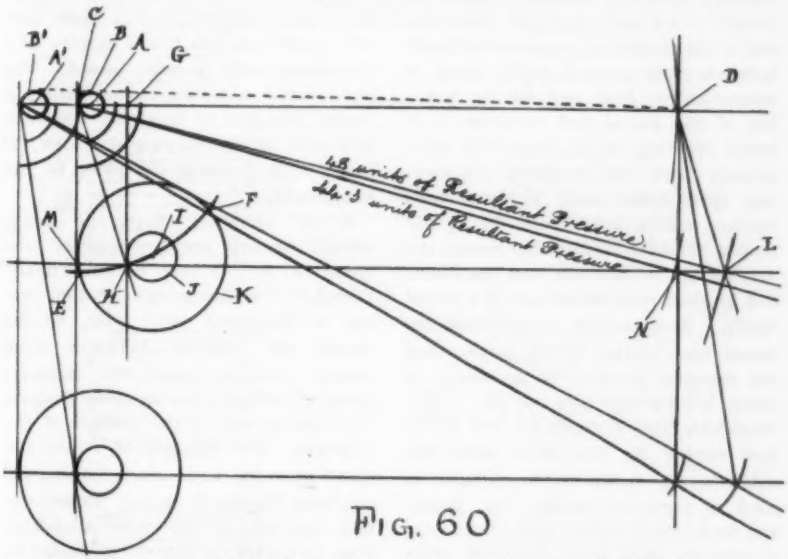


FIG. 60

equilibrant of the resultant force C L or C N.

The foregoing calculation reduced to a simple formula is as follows:—If P = force applied in pounds to weight lever P; L = the distance of application of force P from fulcrum O; l = the distance which connecting rod D is from fulcrum O; M = the distance which connecting rod D is from fulcrum T of lever B; m = the perpendicular distance which the back rest C, in its point of application and in the direction of its force, is from the fulcrum T; R = the resultant force in pounds;

Then P × L × M ÷ l × m = R = 20 × 9 × 8 ÷ 3 × 2 = 240 pounds.

Producing Crimps on Wool.

Since the general introduction of cotton crimps, many attempts have been made to produce the same effect on wool by chemical means. Among the substances suggested mineral acids, bisulphites, stannous chloride, the chlorides of zinc and calcium, citric and tartaric acids, and even resorcin, have been used, but they have all met with only partial success.

Sulpho-cyanides in concentrated solution, it has been discovered, possess the property of contracting or shrinking wool in a marked degree.

In order, however, to obtain crimp effects, it is necessary, in the first place, that every portion of the piece should be uniformly exposed to the action of the steam, and secondly, there must not be the slightest tension or drag on the piece, for, although, after the effect is once obtained, the pieces can be subjected to the same treatment as cotton crimps, the slightest tension during the operation is sufficient to prevent crimping.

—Woolen yarn is scoured in the "hank" and is most often done by hand. The scouring liquids used are the same as used for loose wool.

Construction of Box Chains.

G. WASHINGTON.

The movement of the boxes has great influence upon the steady and even running of the loom, and one of the great considerations in making box chains is to make the necessary changes with as little strain upon the loom as possible.

A good box motion will change the boxes quickly and bring them to perfect rest without any unnecessary vibration. The time that can be allowed for this change to be made varies in different shedding motions. Slow or closed shedding motions, that is, where the healds all come to one level between each pick of weft, allow a comparatively long time for the working of the boxes, and therefore it is found practical to lift them with cams slightly over the required distance, and then allow them to drop upon catches which hold them up at the proper height. To drop the boxes, the catches are withdrawn, and the boxes fall by their own weight on to a lower catch. This method of working the boxes has faults; lifting more than the required distance is necessary to allow the catches play to get under the studs, time is consumed and vibration caused by the drop upon the catches. A counterpoise weight is used to partially balance the boxes, and make them easier to lift, and also to prevent them from dropping with so much force; falling by their own weight, the time occupied in dropping varies according to the number of boxes required to drop; further they have to fall, and quicker the motion becomes, and consequently greater the rebound and vibration caused by the sudden check.

When boxes are dropped negatively, not only does the length of time in reaching the bottom vary with the number of boxes to be dropped, but also the time required for vibration to cease and the box to come to rest. With the advent of quick running looms a more perfect control of the motion of the boxes by the loom becomes a necessity.

The use of catches to hold up the boxes has been abandoned; modern mechanism lifts the boxes the exact distance required and then supports them in that position, thus saving considerable time and much vibration. The nature of the motion imparted to them has been carefully considered, so that they now move with an accelerated motion during the first half, and a retarded motion during the last half of their journey, and thus gradually lose their momentum, and stop without check or vibration. A large lift is accomplished in the same time as a small one, the boxes moving at a correspondingly greater speed. The box motion not only moves intermittently, but also at irregular intervals, and with widely varying strain on the loom, thus causing the loom to run irregularly.

It is necessary that the boxes should change position quickly and come to perfect rest without delay, therefore the intermittent motion cannot be dispensed with; also, as the length of interval between each change depends upon the arrangement of yarns in the required pattern, this also is out of the control of the overseer. The amount of strain imposed upon the loom when making the required change is largely under control, and one of the chief considerations in making a box chain should be to limit the amount of strain imposed upon the loom by any change, as much as possible.

It is one of the laws of mechanics that the power required to move any body varies in proportion to the square of the speed; therefore, as no longer time can be allowed for a big lift than a little one, a lift of two boxes at once takes four times, and a lift of three boxes nine times the power required to lift a single box; hence the necessity of avoiding big lifts whenever practicable.

Attempts have been made to work six boxes at each end, but the strain

imposed upon the loom with a lift of five boxes, namely 25 times the strain of a single box, has been the great obstacle to their success.

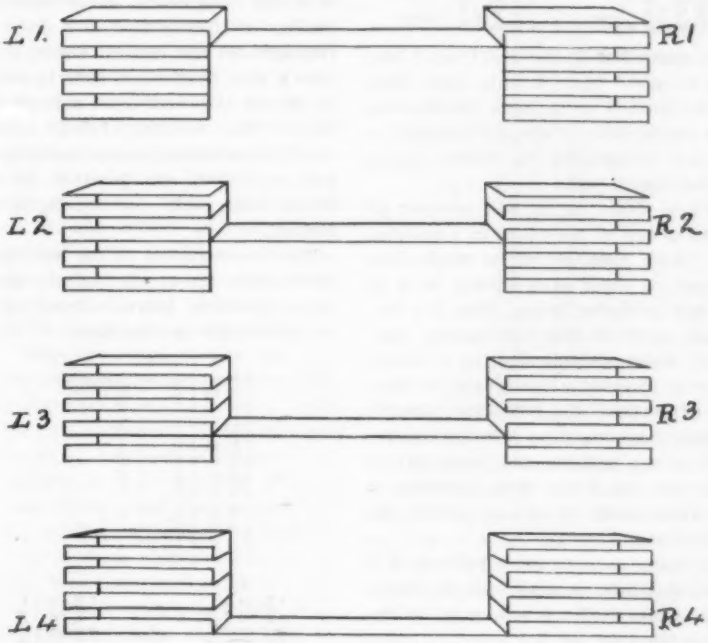
Another source of irregularity is that when lifting, the loom has to overcome the force of gravity as well as to give the required speed; but when lowering, the weight of the boxes assists the loom and tends to help it forward.

When making box chains, therefore, avoid lifts of three, confining the mechanism to single and double lifts as much as possible; it is surprising how much a little thought and ingenuity will accomplish in this direction. When the boxes at both ends of the loom are changing together, it is a great advantage to have one end rising and the other lowering, so that they may balance each other instead of imposing a double strain upon the loom.

It is difficult to see when the bobbins are getting empty in the lower boxes, therefore it is an advantage when practical, to bring each shuttle occasionally into the right hand top box, so that the weaver can see better when the weft is getting done.

For convenient reference, the boxes on the right hand (see illustration) will be called 1 R, 2 R, etc., and those on the left hand 1 L, 2 L, etc. The positions of the boxes indicated by these figures are shown in the illustration. Where more than one pair of picks are required from the same shuttle and boxes, the repetitions are omitted.

When weaving with two shuttles, pick and pick, the box chain can be made in two ways.



1	2
1 R to 1 L	1 R to 2 L
2 R to 2 L	2 R to 1 L
1 L to 1 R	2 L to 1 R
2 L to 2 R	1 L to 2 R

The first chain would lift the boxes at each end for one pick, and lower them both for the next. The strain upon the loom will be considerably heavier when the boxes are lifted than when they are lowered.

The second chain lifts one box and lowers one simultaneously between each pick, therefore the strain upon the loom is uniform.

The order in which the boxes are

assigned to the various shuttles is often an important factor in making a satisfactory box chain. For instance, a chain is required to weave a pattern: 2 white, 2 black, 2 white, and 2 gray. With the white shuttle in the centre box, the chain can be worked with single lifts, while if white is placed in boxes No. 1 or 3, double lifts are required.

3		4	
2 R to 1 L 1 L to 2 R	White	1 R to 1 L 1 L to 1 R	White
1 R to 1 L 1 L to 1 R	Black	2 R to 1 L 1 L to 2 R	Black
2 R to 1 L 1 L to 2 R	White	1 R to 1 L 1 L to 1 R	White
3 R to 1 L 1 L to 3 R	Gray	3 R to 1 L 1 L to 3 R	Gray

In chain No. 4, the right hand box has to move from 1 to 3, and back again from 3 to 1, thus introducing two double lifts, which are avoided in chain 3 by placing the white shuttle in the centre box.

When there is an odd number of picks of any of the colors in a pattern, the chain requires to be made long enough to bring each shuttle back to the box it started from. This is a frequent cause of long box chains, especially when a single pick of a bright color is inserted at intervals to form an overcheck, the checking shuttle moving from right to left for one repeat of the pattern, and from left to right for the next, thus requiring a box chain long enough to weave the pattern twice over.

To make a chain for a pattern of 3 gray, 3 white, 3 gray and 3 black, place white in No. 1 box, gray in No. 2, and black in No. 3.

5

2 R to 2 L 2 L to 2 R 2 R to 2 L	Gray
1 R to 3 L 3 L to 1 R 1 R to 3 L	White
2 L to 2 R 2 R to 2 L 2 L to 2 R	Gray
3 R to 1 L 1 L to 3 R 3 R to 1 L	Black
2 R to 2 L 2 L to 2 R 2 R to 2 L	Gray
3 L to 1 R 1 R to 3 L 3 L to 1 R	White
2 L to 2 R 2 R to 2 L 2 L to 2 R	Gray
1 L to 3 R 3 R to 1 L 1 L to 3 R	Black

Chain 5 commences with all three shuttles at the right hand. After the first repeat of the pattern the white and black shuttles are at the left hand side, the second repeat brings them all to their original position. Also, all the changes are for a single box, one rising and one falling each time.

A pattern, 59 black and 1 fancy, will require a box chain long enough for two repeats of the pattern, or 120 picks.

In pieces with only one kind of weft, when there is any tendency to unevenness and irregularity, either in shade, quality or thickness, it is a great advantage to use several shuttles and take a pick from each, thus thoroughly mixing the weft from several bobbins. The resulting fabric will be much more regular and smarter in appearance than can possibly be produced when only one shuttle is employed.

The thoroughness of the mixing depends upon the number of shuttles in use at one time. Chain 2 already given is suitable for two shuttles.

6

1 R to 1 L,	No. 1	shuttle.
2 L to 1 R,	" 2	"
2 R to 2 L,	" 3	"
1 L to 2 R,	" 1	"
1 R to 1 L,	" 2	"
2 L to 1 R,	" 3	"
2 R to 2 L,	" 1	"
1 L to 2 R,	" 2	"
1 R to 1 L,	" 3	"
2 L to 1 R,	" 1	"
2 R to 2 L,	" 2	"
1 L to 2 R,	" 3	"

7	8
1 R to 1 L	1 R to 1 L
2 L to 1 R	3 L to 1 R
2 R to 2 L	3 R to 3 L
3 L to 2 R	4 L to 3 R
3 R to 3 L	4 R to 4 L
1 L to 3 R	2 L to 4 R
	2 R to 2 L
	1 L to 2 R

Chain 6 is made for three shuttles, using two boxes at each end of the loom. This chain is complete with 4 picks, but is repeated 3 times to show how the shuttles chase each other round the four boxes, each one coming into the top right hand box in turn. The chain requires to go round three times, before the shuttles arrive back in the boxes they started from.

Chain 7 is for five shuttles and three boxes at each end, the shuttles mak-

ing a complete round of the boxes every 30 picks. This chain moves two boxes ot once from 3 L to 1 L, and from 3 R to 1 R it has been planned for the boxes to drop instead of rise, so that it will be easier for the loom.

Chain 8 is for seven shuttles and four boxes at each end, the shuttles occupying the same boxes every 56 picks. The boxes work in the order 1, 3, 4, 2, to avoid the great drop that would be required if they moved 1, 2, 3, 4, and then changed back to 1.

Looms are made with two, three or four boxes, and some have them at one end only, others at both ends. Each variety of loom is adapted for certain classes of work.

When the movable boxes are all at one end of the loom, odd picks cannot be woven from any shuttle, and the number of colors is limited by the number of boxes. The colors can be woven in any order, and any even number of picks from each shuttle. The loom picks alternately from each end of the loom, and no chain is required to control the picking mechanism. With two boxes at each end, any two-shuttle patterns can be woven, because there is a spare box for each shuttle, and therefore each shuttle can be moved as required, irrespective of the position of the remaining shuttle. The box chain must also control the picking motion, to enable the loom to pick twice from one end when required. When three shuttles are employed, there is only one empty box, which changes ends every pick, so that only those patterns can be woven that admit of picking alternately from each end. For instance, 2 black, 2 gray, 2 white, cannot be woven in a two-box loom, nor any three-shuttle pattern where the number of picks taken at one time from each shuttle are all even.

9

1 R to 1 L
1 L to 1 R
1 R to 1 L
2 L to 1 R
1 R to 2 L
2 L to 1 R
2 R to 2 L
2 L to 2 R
2 R to 2 L
1 L to 2 R
2 R to 1 L
1 L to 2 R

Chain 9 is to weave three black, three gray, and three white, the shuttles chasing each other through all the four boxes, completing their round every 36 picks. Any odd number of picks can be taken from each of the three shuttles before the change is made, but if the picks from each shuttle vary in number, the pattern will have to be repeated on the chain until each shuttle arrives in the same box. This is shown in chain 10, which is for one black, three gray, and three white.

10

1 R to 1 L, Black
2 L to 1 R
1 R to 2 L, Gray
2 L to 1 R
2 R to 2 L
2 L to 2 R, White
2 R to 2 L
1 L to 2 R, Black
1 R to 1 L
1 L to 1 R, Gray
1 R to 1 L
2 L to 1 R
1 R to 2 L, White
2 L to 1 R
2 R to 2 L, Black
1 L to 2 R
2 R to 1 L, Gray
1 L to 2 R
1 R to 1 L
1 L to 1 R, White
1 R to 1 L
2 L to 1 R, Black
2 R to 2 L
2 L to 2 R, Gray
2 R to 2 L
1 L to 2 R
2 R to 1 L, White
1 L to 2 R

The following rule will determine if any particular three-color pattern can be woven on a box loom with two shuttles at each end. When an even number of picks has been taken from a shuttle, the shuttle last used must come into action next, but when an odd number of picks has been used, it must be succeeded by the third shuttle. In other words, even picks must have the same color on both sides of them, and odd picks different colors.

Chain 11 is for the following pattern:

11

2 Black
2 Gray
2 Black
3 Gray
3 White
2 Black
3 White
3 Gray
1 R to 1 L, Black
1 L to 1 R
2 R to 1 L, Gray
1 L to 2 R
1 R to 1 L, Black
1 L to 1 R
2 R to 1 L, Gray
2 R to 1 L

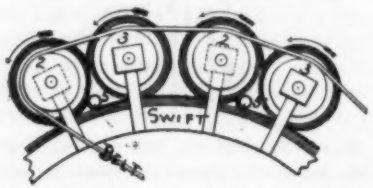
2 L to 2 R 2 R to 2 L 2 L to 2 R	White	
1 R to 2 L 2 L to 1 R	Black	
2 R to 2 L 2 L to 2 R 2 R to 2 L	White	
1 L to 2 R 2 R to 1 L 1 L to 2 R	Gray	

In this pattern the twos of black have gray or white at each side of them. The two gray picks are surrounded by black: the three gray have black on one side, and white on the other; and the three white, gray on one side, and black on the other.

New Arrangement of Workers.

The accompanying illustration is a device that comes from England, and may be of interest to some of our readers, as suggesting a possible improvement for carding machines for certain purposes.

The device consists of a combination and arrangement of workers, strippers, rollers, and cleaners for ob-



taining a greater working surface, so a greater amount of fibre can be carded or cleaned in a given time and with less waste.

The ordinary stripper-rollers are dispensed with and the workers are arranged in pairs around the main cylinder or swift and small stripper-rollers are interposed between the workers of each pair.

The illustration is a fragmentary side elevation of a carding machine.

Around the main cylinder are arranged workers in pairs, all driven at the same speed by a belt. Small stripper or angle rollers are mounted in the angle between one worker of each pair and the swift. These rollers assist in removing the surplus fibre from the workers and place it on the swift. The fibre is operated upon by each of the workers 2, 3, the worker 3 on the right first removing it from the swift, after which the worker 2 removes it from the worker 3 and carries it around until it is taken again by the swift, which delivers it to the second worker 3, when the operation is repeated. The surplus fibre is removed from the workers 2 by the small stripper or angle rollers 5, which return it again to the swift.

Chlorinating Wool.

Chlorine, as is well known, acts on wool according to the dampness of the material, with rise of temperature, evolution of hydrochloric acid, and, if things are pushed to extremity, ultimate destruction of the fibre. The results obtained when the action is controlled by regulating the amount of chlorine and diluting it with atmospheric air have as yet only been imperfectly imitated by the use of hypochlorites. It is true that the inconveniences attending the use of strong solutions of hypochlorites are thus avoided, and, besides, the wool not only receives the desired transparency and lustre, greater affinity for dyes and power to acquire by treatment with soap and acid a silky appearance and feel, but retains completely its pure white color. Mention has already been made of the influence of moisture in the wool. By printing on hygroscopic salts or substances which act as reserves when the wool is steamed quite special effects may be produced. For woolen yarns the amount of chlorine required is from 5 to 25 gallons under normal pressure for 10 lbs. of wool. The gas is allowed to act for half an hour, and the wool is then carefully washed to prepare it for subsequent treatment.

—The card clothing made for Samuel Slater was from sheets of calfskin cut into strips eighteen inches by four inches. The teeth were made by machinery, but the holes were pricked by hand with a couple of needles fastened in a handle.

KNITTING DEPARTMENT.

The Knit Goods Situation.

More knit goods combinations are on the tapis, and it is not unlikely that half a dozen small associations will be the outcome. Perhaps the most, thus far, has been accomplished by the seamless hosiery manufacturers of Eastern Pennsylvania, who recently met at Reading and chose Chas. E. Leippe president. The members propose to act in concert in dealing with the railroads and others. Such a common stand needs only good faith to bring about advantageous results and seems vastly more practical than a general advance in prices, for most departments of the knit goods industry.

The Troy fleece underwear combine is certain to be of indirect benefit to the trade, for such crystallization of sentiment gives courage to any cause. An ounce of action is worth a ton of talk.

Prices have been steadily advancing for six weeks and now run from five to ten cents higher than at the beginning of fall. In a few instances 15 to 20 per cent. advance is noted.

The movement of the Pennsylvania seamless hosiery contingent will be watched with special interest, because at the outset it looks forward to uniformity of action in certain details entering largely into the compound of cost, without imposing hard and fast rules on selling figures, where the canker of bad faith is well-nigh sure to speedily settle. No official promulgation of the Pennsylvanians' policy has been made, but the principles laid down at the first meeting seem uncommonly sensible.

State elections have been the only decidedly disturbing factors in the market of late.

The volume of hosiery trade has been thoroughly satisfactory; would that as much could be said of prices. The demand for better grades is improving, but it is still exasperatingly slow. Relatively speaking, the importing end of the business is in much the best shape. Importers have a steady trade that was unusually convenient to handle. Prices, to be sure, have not been what could be asked, but compared with domestic figures they have been acceptable.

Advices from abroad show that European markets are fixed for some time to come. The upward trend of the German labor market can hardly turn before another fall, and perhaps not then, which gives a basis to figure on for at least a twelvemonth.

There is no better property in the market than choice fancies, and plain colored goods can be depended upon for a year, if not longer. Such shades as cardinals, pearls, purples, tans, niles and national blues are becoming almost as staple as blacks. The best fancy manufacturers have from three to six months' orders ahead. The checks, plaids and crazy designs of a year ago, however, are next to unsalable. More fancies in half hose than ever before are now being shown and next summer promises a rainbow exhibit by men folks.

Of much importance was the recent decision of the board of general appraisers, revising the action of the appraisers' department on dropped stitched lisle hosiery at 4.40 marks, and sustaining the invoices at that figure.

Seamless hosiery manufacturers are bewailing their failure to cover themselves on cotton yarns, now that orders are plenty and quick deliveries imperative. Full fashioned mills, as a rule, have enough orders to last until March. Woolen hosiery is in increasing request and as soon as the opportunities in this field are thoroughly comprehended, a decidedly enlarged output will be forthcoming. The same is true, in a somewhat lesser sense, of merino goods. This business, while limited in extent, is excellent as far as it goes.

Turning to underwear, almost equally brisk traffic is seen, although

this period of the year is ordinarily the between hay and grass season. Manufacturers of heavy weights are seriously talking of skipping a vacation this year. It is a fact that many jobbers had as many orders in hand Dec. 1 as is usual by March 1. This is an unprecedented showing and many are wondering how they will be able to get goods fast enough to appease retailers. After three years of the other extreme, their feeling of helplessness is only natural.

The fleece goods combination now appears to include substantially all the concerns in that line, the outsiders being so few and small as to cut no appreciable figure. Several mills in the combine have unfilled orders at old prices, which invoices can be used as boomerangs to depress the market. Consequently the organization is not ostensibly quoting figures for quick delivery, the notion being to wait until the old orders are entirely cleared up, making plain sailing.

There is no reason why the call for fine fancy goods should not extend proportionately into underwear, where such effects for the most part have been the product of second or third class workmanship.

No evidence is forthcoming to support the claim that any member of the fleece goods combination is squeezing schedule prices, and, while many buyers are holding off, because of the advanced prices asked for heavyweights next year, the increased quotations for raw materials and the general situation will speedily bring about transactions without sellers making concessions.

The regular heavyweight season will open much earlier than usual. In fact, it promises to be in active swing by the middle of December.

The spring order season, which closed three or four weeks since, was probably the largest in volume on record, but qualities and prices were a long way from being satisfactory. Another summer will bring a marked extension in the introduction of open work fabrics, which began to be popular last season.

Loop-Linking Needle.

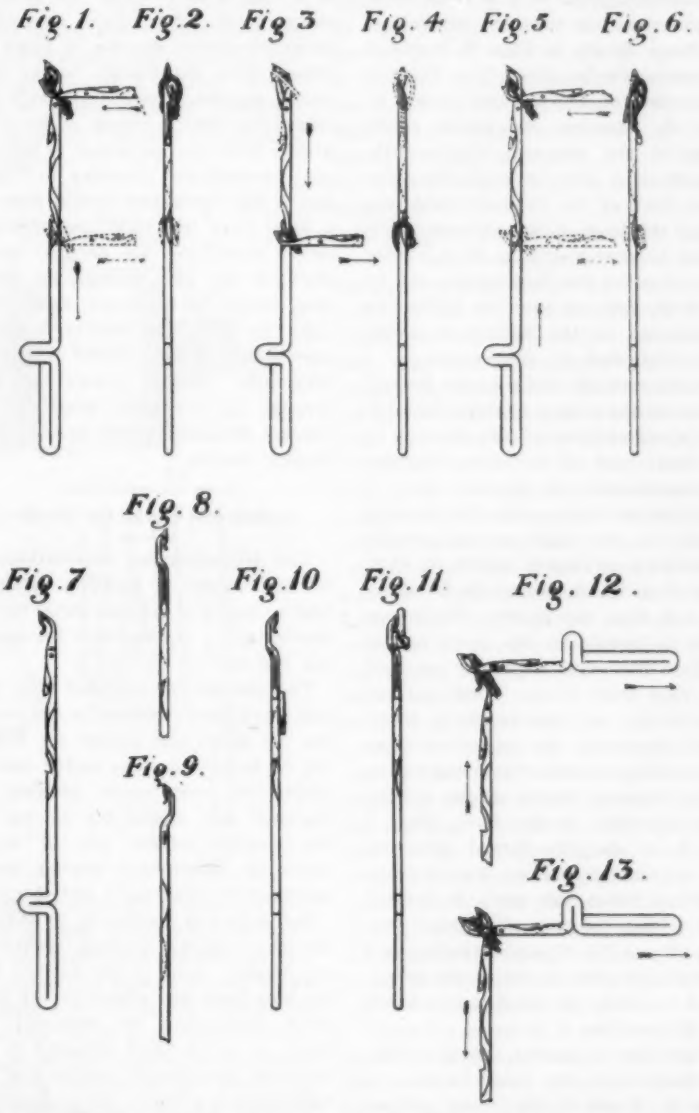
There has recently been invented by a Leicester, England, knitter, a loop-linking needle, which we herewith illustrate, for machines, the gauge or construction of which makes it desirable to be able to link a loop either from the hook or from the needle stem and also to link two loops consecutively from one needle, in one complete motion of the needle.

The design of the needle consists in having a combined knitting and loop-delivering head or hook and a loop-delivering stem adapted to give loops to an adjacent needle; and its features consist, chiefly, of a loop-delivery shoulder on the fore part of the knitting-head, preferably located on the front bar of the hook, formed in a manner as to sufficiently spread its loop in the path of the coacting oppositely-posed adjacent needle as to be received thereby, provisions being made to spread the loop more or less, according to the gauge of the machine and needles, and also of means to allow the offset terminating end of the hook to engage the stem of the coacting needle for the purpose of linking a loop therefrom without locking with the stem, consisting of beveling the stem of the coacting needle obliquely across the delivery-shoulder to fend off the offset hook, and, furthermore, of spear-pointing the top of the hook on a line with its front bar to facilitate the linking of the loop when the hook enters by way of the top and not by way of the terminating end of the hook.

In the illustrations the needles are supposed to be about to move their position in the direction indicated by the arrows.

Figure 1 is a side and Fig. 2 a front elevation of a vertical needle and part of a coacting horizontal needle of similar construction, showing the shoulder-bevel and the loop-shoulder in the front and the usual bevel in the back of the stem, also showing the hook reduced, sidewise from the latch-eye to the spear or needle point, the ter-

minating end being formed into a loop-delivery shoulder (better seen in Fig. 7), and the horizontal needle enters the loop in the forward movement (indicated by the arrow), also



showing how a horizontal needle (dotted lines) having its hook offset receives in its backward movement (indicated by the dotted arrow) the loop (dotted lines) from the stem of the vertical needle when required so to do. Fig. 3 is a side and Fig. 4 a front elevation of similar needles having a loop-delivery shoulder in the cup part of the latch. Fig. 5 is a side and Fig. 6 a front elevation view of similar needles, showing a side twist or offset of the front bar from the line of the back bar of the hook of the needle. Fig. 7 is a side view of a

needle, and Fig. 8 a front and Fig. 9 a back view of the linking part thereof, showing how the front and back bars of the hook are set out of line by offsetting the back bar to admit large and coarse hooks to engage for loop-linking. Fig. 10 is a front view of two coacting adjacent needles of the form shown in Figs. 7, 8 and 9 adjusted side by side. Fig. 11 is a front view of the needles shown in Fig. 10, showing the offset hooks lying in the common linking-path. Fig. 12 is a side view showing the offset hook of the vertical needle entering the loop of an adjacent horizontal needle; and Fig. 13 is a side view showing the terminating end of the hook entering the loop before the spear-point in the backward movement (indicated by the arrow).

In the vertical needle of the several modifications a loop shoulder or stop and a shoulder-bevel are formed in the front part of the stem, whereby a loop advanced on shoulder may be taken by the hook-point of a coacting needle as the said coacting needle withdraws, as clearly shown in Figs. 5 and 6, in which the needle is taking the loop from the needle. The spear-point is located at the head of the hook in line with its front bar, and the rear part of the hook inclined downwardly and rearwardly to facilitate penetrating the loop carried by the coacting needle when linking up in the forward thrust of the needle. The extremity of the hook, Figs. 1 and 2, is abruptly turned inwardly and outwardly, making loop-delivery shoulder, when the latch is formed into a loop-delivery shoulder. (See Figs. 3 and 4.) The terminating end of the hook-point is turned farther inward to allow the latch-cup to lie as flat as possible.

When the horizontal needle is linking loops from the stem, as seen in Figs. 1, 3 and 5, the front oblique bevel fends off the terminating end, and consequently prevents the hook of the coacting needle from locking with the stem when receding to take the loop delivered by the stem loop-shoulder. The usual bevel prevents the hook jamming on the stem when the head of one needle passes the stem of the other.

The operation of the needles in the linking up and complete transference of a loop is as follows: In order to make pearl fabric (two succeeding forwardly-drawn courses of loops delivered from the vertical to the horizontal needles, alternating with one rearwardly-drawn course of loops delivered from the horizontal to the vertical needles) and referring to Figs. 1 and 2, the horizontal needle links up a loop from the stem, as shown in dotted lines, and the vertical needle draws a new loop through the linked loop, which the horizontal needle then links up from the knitting-head, as shown in full lines, after which the horizontal needle draws a loop through the two linked loops and discharges the newly-made loop onto the vertical needle.

Cylindrical Guide for Needles.

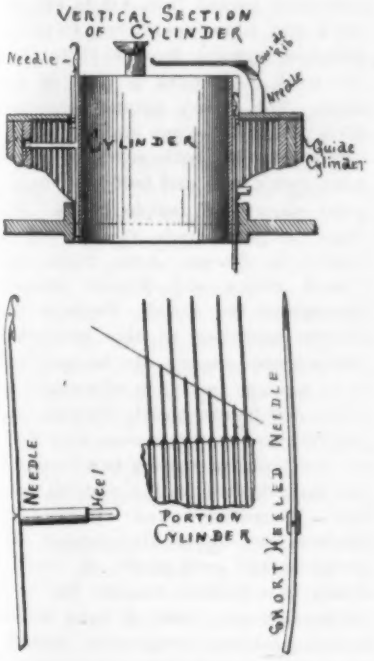
The accompanying illustrations refer to a class of knitting machines which employ a cylinder guide for the needles and a circular cam for operating the same.

The needles are provided with long and short heels, cam-paths for engaging the heels, and means for raising out of action the long-heeled needles while the short-heeled needles are working, and means for raising the short-heeled needles out of action when the long-heeled needles are in operation for knitting a ribbed fabric.

The device is applicable to knitting machines having vertical reciprocating needles, some of the needles having long heels and others having short heels, cam-paths for engaging the heels, a switch-block adapted to engage the long-heeled needles and elevate them to a higher path, means for returning the long-heeled needles to the cam-path, a passage-way through one of the walls of the cam-path for raising the short-heeled needles to the upper path while the long-heeled

needles are in operation, and means for returning the short-heeled needles to the cam-path again.

Our illustrations represent a central vertical section through a knitting cylinder; also a side elevation of a needle, and an edge view of one of the short-heeled needles, showing its lower end, or shank, slightly bent, and a side elevation of a portion of the knitting cylinder showing alternate needles in action and alternate needles out of action.



A machine constructed with this device, or devices, is adapted for ordinary plain knitting when desired and yet is capable of being changed so as to produce a ribbed fabric without removing the fabric from the machine. I am aware that machines have been constructed heretofore for producing ribbed fabrics and also for knitting plain fabrics with the ordinary stitch. These devices, however, have been only able to produce a very coarse rib and one rib for every two needles, so that they are not suitable for very fine knitting. By constructing a machine so that every needle produces a rib a very fine fabric can be knit and yet produce one which is ribbed. To accomplish this, the cams which control the knitting-needles are so constructed that the alternate needles will be thrown out of operation while the other alternate needles are in action and then bring the alternate set of needles which are out of operation into operation while the other set of needles is lifted out of engagement.

In carrying out the objects of the device a needle-cylinder is employed, having the usual guide-ribs upon its outer periphery, forming grooves in which the knitting-needles reciprocate. The needles are preferably provided with heels, those of one set being made longer than the heels of the other set. The lower ends or shanks of one set of needles are made quite long, so as to extend a considerable distance down the cylinder and held in place in the grooves by means of a cylindrical portion of the frame of the machine. This forms a long bearing-surface for guiding the needles in their vertical movement and prevents them from binding and moving with much friction in their grooves. A skeleton guide-cylinder, as seen, is adapted to engage the heels of the needles near their outer ends for assisting in directing the movement of the needles. The outer ends of the heels of the needles engage a cam-path formed on a cam-cylinder, arranged outside the skeleton cylinder. To the inner surface of the cam-cylinder is secured upper and lower steel plates so arranged as to form actuating cam-paths between them.

When the machine is used for plain knitting for the purpose of knitting a flat web or ribbon, it is moved back and forth, giving it a forward and reverse motion. In this case there are used as many needles as are required, according to the width of flat web or ribbon to be knitted.

Knitting Industry in Nottingham.

The United States consul at Nottingham, in one of his recent reports to the State Department, Washington, D. C., gives certain statistics showing the exports from Great Britain, of hosiery, and machinery for the manufacture of hosiery and lace, for the last twenty-two years. The value of exports of hosiery for 1898-99 was less than $300,000, being the smallest amount of any year during this period, except 1897-98, when it amounted to a little less than $200,000. The value of exports was the largest for the year 1882-83, when it amounted to over $1,600,000. Perhaps the most interesting statistics are those giving the value of English machinery that is exported to the United States, which amounted, in 1898-99 to $165,000. The exports of this machinery to this country have been particularly large since 1890, amounting to $340,000 in value in 1891-92. The machinery item has had no separate record showing the relative value of lace and hosiery machinery exported, until since the first of January, 1899, when for the first six months 27 per cent. of the value of these exports consisted of hosiery machinery, and 73 per cent. of lace machinery.

In speaking more particularly of the knitting industry of Nottingham, the consul writes that in a general way the greater proportion of employees consists of girls, their ages running from 13 to about 22 years. British law prohibits the employment of children under 13 years. The trades unions in the manufacturing centres are compactly organized, but the exercise of good judgment and the cultivation of better relations between employers and employees, have largely eliminated the strife so conspicuously prevalent a few years ago.

Some fourteen years ago, one prominent concern with a manufacturing existence of over a century removed its works to a village a few miles distant from Nottingham. It was not so stated, but can here be correctly asserted, that among the primary causes of removal was the constant friction with trades unionism at that time. In its new location, the firm largely created its own environment and has since operated with perfect independence, with results satisfactory both to the management and to the employees.

The hours of labor in knitting mills are from 6 a. m. to 6 p. m. or from 7 a. m. to 7 p. m., with the usual lunch hours. In a talk with one of the managing directors, he stated that full operatives earned from $10 to $15 per week and minor operatives, from apprentices upward, from $1.25 to $6.25 per week. All work is paid by the piece. This firm's output comprises plain and fancy cotton and merino underclothing for both sexes, women's hose, men's hose and half hose, and a great variety of textile goods. Besides the home trade, the exports go chiefly to Europe, Asia, India, the United States, and British colonies throughout the world. Perhaps the smooth operation of this somewhat independent concern can be ascribed to its humane treatment of operatives. About 600 hands, mostly females, are employed. For the women and girls, an iron building, seating two hundred, has been erected, with a view to comfort, recreation, and instruction. Classes are under Government instruction and earn grants on results. There is a similar institute for men on another site. Out of their wages these operatives voluntarily contribute to private sick clubs and hospitals. In this way, in the past year, over $1000 were collected.

This instance is given as a somewhat interesting exception. In the average city factory, operating under the strictest of union rules, work is also done entirely by the piece. For females, the hours are from 9 a. m. to 6 p. m.; for males, from 6.30 a. m. to 6 p. m., with one and one-half hours for lunch, or fifty-four hours for five and one-half days, Saturday being a half holiday.

Nottingham is the largest consumer

of yarns, both cotton and woolen, in England, and Manchester is the greatest selling market. The Australian drouth of last year, and the unusual disease there and in other colonies among the flocks, seem to be chiefly responsible for the rise in woolen yarns, still maintained, which has amounted to about 20 cents per pound since September last. By far the greatest bulk of woolen and cotton yarns used is English spun, coming chiefly from Manchester; but the exact proportion is difficult to estimate. The German yarns are next in favor, costing owing to cheaper German labor, approximately the same as similar grades of homespun.

In speaking of the use and comparative merit of English and German yarns and their cost, one manufacturer stated that he would price the best standard English cashmere at 72.9 cents per pound and a similar German yarn at 67.9 cents—a difference in American money of 5 cents per pound in favor of the German yarn. In all respects, save one, he said, the yarns would be identical, the German having a peculiar soft finish that for some reason is not secured by the English spinners. The varying taste of different markets, is, of course, consulted in the choice of yarns.

Nottingham exports almost every conceivable article in wool, cotton, and silk classed under the expansive trade term of hosiery, which includes underwear of all descriptions, as well as golf, outing, and sporting specialties. Each manufacturing concern sems to have its own peculiar export fields, and these it holds and extends by catering to local demands as to style, price, and quality, extreme care and pride being shown in maintaining its reputation and the reliability of its goods as well as the inflexibility of its quotations.

British exports to Central and South America show a serious decline and continue to be more or less spasmodic, being confined to firms possessing exceptional local advantages acquired perhaps by chance, and maintained apparently without that cultivation of the market so noticeable now in the Far East, in Canada, Australia, and India. For instance, the manager of one firm stated that some years ago, there was a steady and active trade with South America, the demand, however, being for the cheaper grades of cut cotton; but that of late, this trade had almost vanished, owing partly to the introduction and growth of local manufacture of the same class notably at Buenos Ayres, Argentine Republic, but chiefly to the persistent competition of Spanish manufacturers located at Barcelona, Spain, who paid wages with which British competition was impossible, who possessed as a rule favored trade relations with the Spanish-speaking countries of Central and South America, and who were favored by better knowledge of local demands and the intricacies of commercial usage.

The manager of another house reports that his best success is with fancy goods, which the South Americans are unable to make themselves and which are chiefly imported either from Spain, France, or England. They appear to want stripes and color, the more the better, and this applies to cotton as well as to the cheaper silks.

Great Britain, in hosiery as in other manufactures, maintains a characteristic and stubborn preference for home products, and furnishes, with her colonies, the greatest developed market for British manufactures. For several years, her exporters have assiduously cultivated the opening Chinese field, and they view with especial alarm the growing success of American goods and methods in that territory. Said a manufacturer prominent in the Chinese trade:

"As to German competition, we have no fears. In my own experience I have lost at times a number of Chinese customers through German underbidding, but in each case they have returned voluntarily, giving pretty shrewd trade reasons for doing

so. They have an acute trading instinct and must be satisfied that they are not only given bottom prices, but that the goods are exactly as represented. They are quick to detect any variation between samples and invoice, but once gain their confidence, and they are excellent customers in all respects."

The cheapness of German labor at one time resulted in the experiment of importing hosiery and textile bodies, finishing them in Nottingham and then marketing the finished product both at home and abroad as "goods made in England." That this practice was profitable, may be assumed from the success of the trade unions in securing a law which requires that all goods so marketed or exported be stamped as manufactures of the country whence originally imported. This law, rigidly enforced, coupled with the antagonism of organized labor, seems to have brought the practice into disuse as well as disrepute. While some individual profit may have accrued from such methods, the effect upon English trade as a whole was unhealthy. Foreign purchasers of such goods through English finishers became inquisitive, and many reached the not unnatural decision to trade direct with Germany and save middlemen's profits. Thus the German market, through English effort, was exploited to the detriment of English manufacturers. There are agents, or commission houses, at London and the larger trade centres who fill foreign market orders of any description, but if certain German or other goods are included, they are generally shipped direct from place of production.

Information Wanted.

Editor Textile World:

We are making 10-gauge flat wool goods on a 20-inch cylinder, and while this makes the shirts all right, we find that the drawers are too thin and light, in the upper part of the leg particularly. We cut the drawers by reversing the pattern, and give this part of the leg all the cloth possible. Can you help us out of the difficulty? We could use a 22-inch cylinder for drawers, or make the cloth heavier on a 20-inch cylinder, but would like to know the best way.

T. H.

It seems to us that goods made on a 10-gauge machine with a certain size of yarn, will make the same weight cloth whether this cloth is made up in shirts or is cut up into drawers. The cloth in the drawers should be the same weight all the way through, even if the pattern was reversed in cutting. It is very evident that if the whole dozen of drawers is lighter in weight than desired, more weight must be added in the way of heavier yarn on the same machine (in diameter we mean). To make the drawers on a larger machine of same gauge and yarn would not give the extra weight desired except by increasing the size which would not do. Hence, the only way we can see to increase the weight, without increasing the size, would be to use heavier yarn. We can see no advantage in using a 22-inch cylinder, provided, of course, the 20-inch cylinder cuts to advantage, but a decided disadvantage on account of making waste, which is always in any mill a serious matter. We fail to understand why drawers should be thinner and lighter in the upper part of the leg, unless the drawers are cut too narrow at the seat and when boarded on forms are stretched too much at that point, in which case we should recommend using the 22-inch cylinder, or larger, if necessary. We should be pleased to hear from some of our practical knitters, who are readers of this magazine.

—Originality of idea is a necessary living quality in all purely artistic novelties; but it is natural, and not forced, as in eccentric work, in which the absence of unity of parts and spontaneity of structure of design coexist with crudeness and incongruity.

SILK DEPARTMENT.

Manufacture of Silk Taffetas.

LUDWIG BRAUN.

For nearly three years taffeta has been the most popular form of weaving in silk. The purposes for which taffetas are used are many and varied, as for dresses, waists, trimmings, underskirts, linings, under and outer garments, etc. Therefore we think a series of articles showing designs and giving rules and information for the manufacture of different styles of taffeta goods would prove very interesting.

The first essential for producing a good manufacture of plain silk taffetas is to have a faultless raw material. To begin with, it must be smooth and closely twisted; and for this reason, Chinese or Japanese materials are inadmissible, owing to their being too rough. For warp, it is best to employ a superior article from Milan or from Turin; for figure designs may be used a good quality of Japanese organzine, but not for plain fabrics. The charge of the warp-thread should not be more than 40-50 per cent. for black silks, 8-10 per cent. for dark colors, and not more than 5 per cent. for light colors. (White especially should be without charge.)

To ensure good weaving it is of the highest importance that these charges should not be exceeded, and also that the size of the organzine should not fall below 20 deniers (international), and that it should be closely twisted. Plain taffetas are best woven in tappet looms, the lift and other movements being more regular, and more under control, than in a witch or dobby loom. As to the closeness of the reed for silk taffetas it should not contain more than 78-80 dents per inch. It is much better to use a reed of 60-75 dents per inch, and take the organzine a little thicker, than to use a fine reed and fine organzine.

As to the weft, it is above all necessary to choose a material which is very strong and polished. The best tram to be used is Japanese tram in three-ply, in a size of 32-36 deniers, international, with 125 picks per inch. The produce from Japan gives a fabric that is fuller in hand than the fabrics made of Italian or Chinese raw silk; as much as the Japanese tram is best for absorbing the substances of the charge. To obtain a fabric as uniform as possible it is necessary to use three-ply tram, especially if the weft is shot in single.

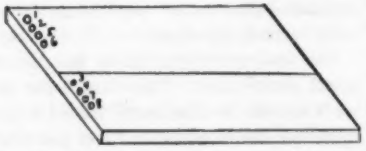
The charge of the tram is also of great importance. The charge for the weft should not be more than 120 per cent. for black silks, 30 to 40 per cent. for dark colors and only 10 to 20 per cent. for light colors (for white, only 10 per cent., not more). If these charges are not exceeded, the manufacturer can assume a full guarantee for the good wearing of the silks.

Two years ago, in Germany and in Switzerland, there were many manufacturers and dyers who had to pay damages of several thousand marks, because they had charged the tram for silk taffetas 80 to 100 per cent. for colored shades, and therefore the fabrics were broken in two months.

Another most important point is that the dyed material, when not for immediate use, should be kept in a dark room. Sunlight is the most dangerous enemy to all charged silk materials, particularly light colors. Therefore it will be best to work off the dyed material as soon as possible. I can call to mind many cases coming under my own observation, in which unused charged silk was completely rotten in four months. As all silks are not finished, they must be as smooth as possible, as they come from the loom. The only means of getting it is putting a strong tension on the warp. And here strict supervision must be exercised over the weaver,

who is naturally inclined to ease the tension. If the fabric has one time been crisped, it is very difficult to render it smooth again. It is also a good plan to place under the fabric stiff, smooth paper, cut from one solid piece.

It is almost unnecessary to say that lease rods, healds, mails and slay should be in a perfectly finished-off condition. The shuttle race should be planed slightly concave, so that in crossing the warp there will be only the shuttle's own weight pressing on the ends, with no additional stress occasioned by the force of throwing it.



It should be rubbed down with the finest emery paper always before putting in fresh warps, and brushed over with one or more coats of shellac varnish, which dries in half an hour, and is made by dissolving yellow shellac in alcohol, in parts, according to the stiffness required. The shuttle should be kept in good condition and any tendency to roughness at once taken in hand and smoothed out, and even polished, after smoothing, with finest emery paper. It is best to apply shellac varnish to all such places after polishing and allow to dry before using the shuttle again.

Taffetas are also much used for ground work for figured designs, and in the manufacture of Jacquard designs with large figures, which cover a great deal of ground. Canton tram, four-ply, shot in single, may be employed as weft to great advantage. A very profitable quality can be manufactured as follows:

Warp—Milan organzine, 58's reed 4's, 20 deniers (international), charged 5-10 per cent., dark colors. Weft—Canton tram, 115 picks per inch, 48 deniers (international), shot in single, charged 50-60 per cent., light and dark colors.

Canton raw silk is very downy, and therefore, the product made from it must not be used for plain taffetas; but four-ply makes the thread much more polished and the twist covers the down. The employment of the thick thread of tram offers several advantages: (1) the raw material is much cheaper than the product from Milan or Japan; (2) the thick thread can be more strongly charged (up to 50-60 per cent.); (3) the reeling of thick thread involves much less loss than that of fine.

To obviate crumpling of the taffeta jacquard, the ends may not be entered, draft straight on. This manner of drawing would result in a streaky fabric. The draft into the healds of the harness must be done as follows: The side board of the loom must be sticked two and two, that is to say, the sideboard must be divided into two parts as shown in the accompanying sketch. The first two threads come side by side of each on the first part, the threads 3 and 4 come on the second part of the sideboard, 5 and 6 on the first, and 7 and 8 on the second, etc.

In this method of drawing, (1) the lift and fall of the warp causes less friction of the warp-threads; (2) the shades in light colors remain clean; (3) the weaver will produce a faultless fabric and some yards more a day. This method may be adapted also profitably to fabrics with satin or twill ground. Generally, twill grounds do not appear to be very popular in silk goods, although there is in these an endless variety in style, quality and weave.

In taffeta fabrics the difference in the production of hand and power looms is not so large as with other fabrics; for example, satin and twill goods. Therefore, taffeta can be produced today, profitably, in hand looms. In this case the plain goods must be woven side by side. There is no difficulty in weaving the coarser qualities of plain taffetas in the ordinary silk power loom, but there is a demand for fine qualities, which, as

yet, it has been found impossible to weave by power, and their production is almost entirely dependent upon the hand loom. The difficulties are not numerous, but important, being caused by the extreme fineness and frailty of the warp and the great number of threads required in a small space. The weft is generally no more difficult to manipulate than in ordinary cases, so most of the attention and care can be devoted to the warp and the parts of the loom with which the warp comes in contact. Every year, however, the power loom makes further encroachments, and will in time be able to make even the finest grades of all silk taffetas.

There are, besides, numerous small effects and combinations, in which taffeta is used as a ground-work. The plain kinds of stripes should, if the stripe part is a fine satin, be woven, if possible, in tappet looms. An eight-end satin stripe on a plain taffeta ground only requires ten tappets, allowing two for the plain, and that number may easily be accommodated on an ordinary loom. This combination is very common in striped moires, pekins, etc. A style, now the largest specialty for petticoats, is made in the following manner:

Two warps (1) plain taffeta ground: 66's reed, 2's organzine, 20 deniers (international). (2) stripe 8 shaft satin: 66's reed, 6's organzine, 18 deniers (international.

These combinations are best woven wrong side up. The ground should, of course, be dressed on a separate warp beam to the stripe ends, and should be about 12½ per cent. longer. As material for the weft of this fabric can be used either 80/2 cotton or two-cord yarn, 95 picks per inch, shot in two-ply; the ground is generally black and the stripes colored. As the weft is, of course, likewise black, the satin stripes must be of a good fineness, otherwise the black threads of the weft will shine through.

All these styles hitherto described are, of course, dyed in hanks. Piece-dyed taffetas can also be manufactured, but not in half silk. Plain goods in taffetas must be always all silk.

(To be continued.)

Quilling.

The process of quilling is the act of winding the silk on to shuttle bobbins termed "quills." While wool, cotton and flax can be formed into cops, the tenderness of silk, and its non-adhesiveness, after being dyed, and costliness, prevents experiments in this direction. The necessary waste caused by such a process would more than offset the small gain.

It being very general to use silk filling consisting of 2, 3, 4, 5, and 6 threads to produce a good body in the fabric, and to make desirable effects in patterns, the silk (tram) is doubled as desired.

The frame used for this purpose is similar to other silk winding frames, except the swifts, which are omitted, and a series of pins, or stationary vertical spindles secured in place thereof, on which the spools (on which the silk has been previously wound from the skein) are placed; small friction levers, having adjustable weights thereon, resting on the spools. A series of pivoted wire stop motions is provided to control separate threads. This operation is termed "doubling," the frame being termed a "doubling frame."

It is an unquestioned fact that better operating quills have never been made than the old-fashioned "hand wound quills."

The first power quillers were provided with cone cups, which have been superseded by a series of rotating cones. The objectionable feature of the former machines is the liability of the silk becoming scorched through frictional contact with the cones. This has been minimized by inserting in the whirl two small rollers, between which the spindle passes; and by a construction of a frame in which the spindles are secured horizontally to the length of the frame, a wood disk be-

ing secured on a vibrating rod, the disk, on its outer circumference, being convex. This form of machine has the reputation of performing good work.

A machine, combining doubling and quilling, has been in use for some time, in which the filling is guided by a stationary eye, and the spindle provided with a rise and fall movement.

The latest frame to be adopted is one in which the principles of the cotton spinning frame are utilized, the spindle holding the quill being stationary, with two uprights, provided with a system of worm threads, on which the flyer or traveler rotates, and which also has a rotary motion. This form of machine necessarily puts a slight twist in the filling, which, it is claimed, is afterwards taken out as the filling is woven. When the filling is wound on the quill, on the principle of the old hand wheel, in which no twist is put in, the process of drawing the silk off the quill while weaving necessarily puts a twist in, and the less twist in the filling, the better the fabric.

As a weaver can be put back in her work, and defective cloth made, by using imperfect quills, a carefully managed quill room will pay for itself. An empty quill is placed on the spindle, the end from the spool is attached to it, the thread is placed in its proper guide and allowed to run. When the quill has become full it is removed and a fresh one started.

One method of starting the thread on the quill is to pass a few turns of thread around the quill before placing it in an operative position. Another method is to have the empty quill in position and wrap the thread in the groove of the spindle head. As this process is repeated several times the groove becomes filled with silk, preventing the quill from falling into its right position in the shuttle, and is a frequent cause of the warp threads breaking, and of the shuttle clips becoming extended. As the full quill is removed the finishing end of the silk is carried back on the quill, so as to be readily found by the weaver.

It is a good policy to guide each knot made in the thread while quilling to the top of the previous filling wound on the quill, as in the majority of cases a knot, or nib, allowed to wind on the quill, and covered with other silk, will break the filling, at the same time plucking the edges and breaking the threads out.

Boards, provided with means to suspend them, and with a series of short lengths of wire driven therein, on which the quills are placed, heads down, are used to hold the filling. While the weaver is emptying the quills on one, the quiller is filling the other.

The quiller receives the order as the warp is being placed in the loom, and is again notified a few yards before the warp is finished, so as to enable him the better to arrange his work.

In some mills it has been found necessary to impose a fine of five cents for missing or broken quills, to obtain carefulness. For perfect work, cleanliness in frames and operatives of the quilling room are essential, and for the best results nimbleness and adeptness are very desirable. An occasional examination of the empty quills is desirable so as to insure good results, as defective quills can be found and oftentimes remedied. A small blemish, as a scratch, or a speck of a hard or sticky substance, will often cause the filling to break.

CAMPBELL.

Care of Silk Worms.

The newly hatched silk worms in Southern Europe are kept for two days in a temperature not lower than that in which they were hatched, and fed on finely cut leaves once in two hours. As soon as these tiny worms appear, fine gauze or perforated paper is placed over the eggs, upon which the worms crawl; and then, in order to get them together, small mulberry leaves are placed upon the paper or gauze, which are soon covered with the worms, when they are removed to other sheets of paper. It is necessary

to place the worms far apart, as they grow very fast and require room corresponding to their growth.

They must also be kept very clean and have plenty of air, since they breathe through eighteen openings, nine on each side of the body. Besides, it is a very important feature that they have sufficient space, so that the weak may have an equal chance with the strong, and that the appearance of disease may be the more readily detected. It is stated that there is a greater production of cocoons when the worms are not crowded.

The bedding must be changed every day at first and twice a day in the last stages, and removed at once from the rooms, in order that any germs of disease may not be allowed to collect. These changes are made by means of gauze or perforated paper, that the worms may not be injured by the handling.

All this work with the larvae is done in the houses of the peasants, the young worms being taken after the first few days in quantities sufficient for each house, one room being given up to this purpose. This should be a room in which air and light can enter freely, and also one that can be thoroughly protected from the outside cold, and with means of heating, as the worms eat very little in a temperature below 68° F. As any sudden changes in temperature are very dangerous to the worms, the rooms are heated by means of fireplaces, which, although the more expensive, offer a good means of ventilation. Stone stoves are also used, but metallic ones never, as they are more difficult to regulate.

In rooms where the heating is entirely done by stoves, it is necessary to have some kind of ventilators, to be used when it is too cold to allow the windows or doors to be left open; but this ventilation must be so arranged that the cold wind never blows directly upon the worms. When the windows or doors are left open, there are curtains hung over them, which can be dropped if it should prove a little too cold.

The shelves or platforms upon which the worms are kept are built in the middle of the room, one above the other, with a space of about 2½ feet between them, giving plenty of room to examine all parts of each tier.

The lower platform is always some little distance from the ground, so as to avoid all dampness. Some of these rooms look very clean and fresh, with whitewashed walls and well-scrubbed floors, while others lack the whitewash and have only floors of dirt. No refuse is allowed to collect, and all these houses where the silkworms are reared show the result of effort to keep them clean.

The Eggs of the Silk Moth.

The eggs of the silk moth are hatched in France artificially, by means of incubators, because if allowed to proceed naturally the caterpillars would be produced at unequal and long intervals. The temperature of the incubator is allowed to rise gradually from 54° to 74° F., thus imitating the process of nature.

Incubation lasts from twenty to thirty days. Before provoking the artificial hatching of eggs, the custom in the south of France is to place them in a cold room, where the temperature varies between 37° and 50° F., during the five months of winter. Formerly the cultivator who reared silkworms selected, from his finest cocoons, the quantity of eggs necessary for the following season; 20 pounds of cocoons furnished 15 ounces of eggs, or "grains" as they are called. In the year 1847 a terrible malady ravaged the French rearing houses; the worms, instead of developing progressively, both in volume and energy, languished, became covered with black spots, and finally perished. This disease, called pebrine, which is hereditary, epidemic, and contagious, increased with such intensity that the grain had to be imported from Italy to continue

the industry. It was not long, however, before the Italian grain was attacked in its turn, with the result, for France, that whereas 25,000,000 cocoons were produced in 1853, the amount had fallen to 5,000,000 in 1865. For several years the grain was obtained from the provinces of the Danube and from China, but the production was unsatisfactory, and the eggs became more or less contaminated after their arrival in France.

At this critical period (1865) in the history of the French silk industry, it was discovered that the Japanese grain resisted the disease (pebrine) and large quantities were imported for several years, or up to the time when Pasteur showed that the only remedy for the malady consisted in the selection and isolation of the apparently healthy moths and in the microscopic examination of the eggs and the dead insect. This system has been followed ever since. A part of the moth, or some of the grains, is rubbed up in a little distilled water and a drop of the mixture put under the microscope; if pebrine be present, a quantity of small corpuscles is seen on the plate, indicating the nature of the malady. It was owing to this system that the production of the silkworm in France revived. Of late years, not only has the country been able to supply itself, but it now exports over 300,000 ounces of silkworm eggs annually.

The Silk Worm.

In speaking about the silk worm and the way in which it spins its beautiful web, a naturalist, says the Washington Post, who has spent many years in studying the industrious little insect while at work, recently said:

"The worm is, in the first place, the larva of a small moth which is hatched from an egg in the spring in a natural state at about May, in a temperature of 70 degrees. They may however, be hatched at any time, provided the temperature is maintained. They are very tiny at the start, and after coming into the world have a sick period of some two days.

"Before spinning they cast their skin four separate times, and when they arrive at what is called the last stage, which is just before the cocoon is begun, the greatest care and attention are required, and in silk growing countries the attendants are obliged to sit up day and night in order that the worms may have abundant food, for in the last stage they require more nourishment than they have had before all told. During this time they will not move from the mulberry leaves on which they feed, but upon the eighth day they begin to look about for a suitable twig upon which to spin their cocoons. When this is found they begin to weave about them the cocoon, throwing the fine silken filament from the spinneret, which is situated in the lower lip.

"The filament issues at the rate of from four to six inches per minute, the worm making in that time sixty-five elliptical motions of the head, or a total of 300,000 in an average cocoon, which requires from three to five days to complete. The walls of this silken dwelling are composed of from eight to ten distinct layers, each of which is completed separately. Having spun himself away the worm goes into the chrysalis state and remains there from ten to fifteen days, and then develops into the moth. Before this last change takes place the insect is killed within his house and the silk is then unwoven by an ingenious device and you have your raw silk.

"There are 349 known species of silk producing insects, the largest portion of them being natives of Africa, Asia and Australia. North America has sixteen native and one exotic species. Ten to twelve pounds of leaves consumed by the worms produce one pound of coccons, and three and three quarters pounds of cocoons yield one pound of raw silk."

The Mulberry Tree.

It was during the reign of Henri IV, in the seventeenth century, that the cultivation of the mulberry tree was introduced into France by Olivier de Serres and Barthelemy Laffemas, and in the beginning of the following century homespun silk appeared on the markets of several towns in the southern part of the country, while in 1763 Boissier de Sauvage published an important treatise on the rearing of the silkworm.

As is well known, the mulberry tree presents several varieties, the most important of which are the black, the white, and the variegated, and of these the second variety is preferred in France, as it develops without much care and can be easily cultivated either from the seed of the plant or by grafting. It reaches maturity more quickly than the black species, and the silkworms take to it more kindly. A mulberry tree, at 5 years of age, furnishes, in France, 72 pounds of leaves; at 10 years, 104 pounds; and at 22 years, 200 pounds. The practice is to strip the leaves once in every two years, as it has been noticed that the tree lives much longer than when deprived of its leaves annually. Besides this, the leaves acquire a superior degree of firmness and brilliancy. As to the climate, the most favorable to the cultivation of the mulberry tree is that which suits the vine.

When the leaves are gathered, they are placed for eight or ten hours in a cool and well-ventilated room, in order that a good portion of the moisture may evaporate before giving them to the worms. It is remarked that the leaves of the mulberry tree in its natural state give better results than those of the grafted tree, being richer in nutritive principles. They are, however, smaller and more difficult to pluck from the branches and wither more quickly. Hence, preference is given in France to the grafted variety. However, the custom is to give, when possible, the leaves of the natural tree to the worms during their first three ages, and those of the grafted tree during the two last ages.

Breeding of Silk Moths.

As there is great care taken in selecting only perfectly formed cocoons to hatch the moths, so the greatest care is also taken to select only the perfectly formed moths for breeding. But there is this difference: While the imperfectly formed cocoons can still be used for a certain grade of silk, the deformed moths are at once all destroyed. The ones selected are now placed upon large sheets of blotting paper, at convenient distances from each other, and at once taken into a darkened room, that they may not be disturbed in mating.

The copulation is effected in about half an hour, although it is considered better to leave them together for a considerably longer time. If the males predominate in the first hatching the extra ones are carefully kept in boxes until the next birth, when it may happen that the females are in the majority. If the females predominate, the extra ones are kept on sheets of paper until the males have rested from their first copulation, when they are used a second time.

The separation of the male and female is made by taking them by the wings and most carefully drawing them apart, that the female may not be injured. The males are at once destroyed, and the females left upon the paper for some minutes, or until they have discharged the red liquid (which they always do), that the places where the eggs are to be deposited may be kept clean.

The next move, which must be made immediately, that they may not lay their eggs in the wrong spot, is putting them into the little gauze bags or upon sheets of cloth, where they deposit their eggs in from twenty-four to thirty hours.

—The scouring of loose wool should be prefaced by washing the wool first with water, which removes the suint, but, as this would entail another operation, and as it is claimed that suint acts as a detergent, this operation is usually omitted, and the wool is scoured straight away.

POWER DEPARTMENT.

ELECTRICITY—STEAM—WATER.

The Influence of Mechanical Draft Upon the Ultimate Efficiency of Steam Boilers.

Abstract of a lecture delivered before the Engineering Society, by Walter B. Snow, of the Engineering Staff of the B. F. Sturtevant Co., Boston, Mass.

(Continued from November.)

The fact just presented points toward the economy to be secured by comparatively high rates of combustion, when the proper rate of heating surface to grate surface is provided. A high combustion rate manifestly requires a thicker fire, which, in turn, presents a better opportunity for contact between fuel and air, with consequent economy in the supply of the latter. Less air results in a more intense fire, a higher furnace temperature, a greater transmission of heat to the water within the boiler, and a resultant higher evaporative efficiency. But a thicker fire requires a greater intensity of draft to overcome the increased resistance, while the relatively smaller area for passage of air necessitates a higher velocity of that air, and, furthermore, the increased intensity to produce this velocity must be proportional to the square of the rate of flow.

This condition is most readily met by the fan, which, under normal conditions, produces an intensity exceeding that of an ordinary chimney, and which can without trouble maintain the highest practicable rate of combustion.

Whitham found that, with a certain mechanical stoker, in which the air distribution was almost ideal, an excess of 85.6 per cent. was used when the rate of combustion was 12 pounds, while almost perfect evaporative efficiency was maintained when the rate was 45.4 pounds, and the air supply actually 11.2 per cent. below the chemical requirements.

Among the losses incident to combustion, that resulting from the formation of smoke is absolute, for it is equivalent to directly robbing the fire of a part of the fuel from which not only has no heating effect been secured, but upon which heat has actually been wasted in raising it to the temperature of the escaping flue gases. Fortunately, from a purely economic standpoint, this loss seldom, if ever, exceeds one per cent. of the total calorific value of the fuel. In fact, the prevention of smoke is not to be considered so much in its economic aspect as in its relation to the stringent laws which are being enforced in many communities. It thus becomes a question of life or death, for, unless the smoke is prevented, the boilers cannot be operated. For the prevention of smoke, sharp, intense draft is necessary, properly regulated and capable of furnishing the required amount of air, both below and above the fuel, at the very moment when it is most needed.

This result can be best secured by the introduction of mechanical draft, which is ordinarily so regulated that the decrease in steam pressure resulting from the opening of the fire doors, the charging of the furnace, or the cleaning of the fires, instantly causes an increase in the speed of the fan and in the intensity of the draft and the volume of air. The inherent ability of mechanical draft to maintain a high furnace temperature co-operates to make the discharge of smoke almost impossible. Good firing or the employment of mechanical stokers is necessarily conducive to smoke prevention, but of course good draught must still enter as a first consideration.

A loss incidental to poor draft is that due to the formation of carbonic oxide. The formation of this gas, instead of the complete product of combustion, carbonic acid, results from a lack of air, and may, under adverse conditions, mount up to a resultant loss of five or ten per cent. and over of the calorific value of the coal. This

loss can be best avoided by the employment of some means like the fan, which, under automatic regulation, increases both the intensity of the draft and the volume of the air when required. As a result, the pressure forces the air in sufficient quantity to all spaces between the fuel, and renders the combustion practically perfect. Numerous carefully conducted analyses of the flue gases fail to reveal the presence of any carbonic oxide when mechanical draft is employed.

By far the most important of the factors connected with the operating expense of a boiler plant, is the cost of the fuel. When burned under suitable conditions, the decrease in its cost usually far outstrips its decrease in efficiency, so that the solution of the problem involves itself with the provision of the proper conditions. As a rule, the cheap fuels, like the fine anthracites, require for their combustion an intensity of draft which the ordinary chimney is incapable of producing. Speaking of the chimney in this connection, Coxe asserts that "it is always very difficult, in fact almost impossible, to obtain with it sufficient blast to burn the smallest sizes of anthracite coal, which require a strong and concentrated draft." It is here that mechanical draft presents itself as a solution, for it fully meets the most exacting requirements as regards intensity, costs far less for its installation than a chimney of equivalent capacity, and is capable at all times of producing the blast necessary for securing the best results in the furnace under the varying conditions of fuel supply.

What these requirements are is evidenced by the accompanying figures taken from the reports of careful tests of Pea and Buckwheat coals, conducted by Cox, who made a most exhaustive and critical study of the methods and appliances necessary for the successful burning of the fine anthracite coals of the Pennsylvania region.

These coals, which are among the smallest in size, were burned on a special form of traveling grate and the air pressure was maintained in the chamber beneath. It is noticeable that with practically constant combustion rate and evaporative efficiency, the draft increases very rapidly as the size of the coal decreases.

Results of Tests of Pea and Buckwheat Coal.

Kind of Coal.	Rate of combustion per square foot of grate per hour.	Pounds of water evaporated from and at 212° per pound of coal.	Air pressure in inches of water.	Maximum limit to size of coal in inches.
Oneida Pea Coal	13.63	8.56	0.375	⅞
" No. 1 Buckwheat	13.58	7.94	0.5	¾
" No. 2 "	11.40	8.60	0.625	⅝
" No. 3 "	11.34	8.65	1.04	½
Eckley "	9.44	8.75	1.125	3/16

The comparative efficiency of various coals as determined by Barrus is indicated in the accompanying table, which is self-explanatory. The evidence in favor of burning low grade fuels is conclusive. Such results can, however, only be secured by positive and intense draft.

It is true that, as the quality of coal grows poorer and the size of the particles less, it becomes more necessary to provide some special form of grate or stoker for its proper burning. But even without an economizer, which is then of questionable utility, the burning of cheap fuel by mechanical draft

will, under perfect conditions, show a decided saving, after due allowance is made for fixed charges on the special furnace arrangements and for the cost of operating the fan.

RELATIVE EFFICIENCIES OF VARIOUS COALS.

Kind of Coal.	Water evaporated from and at 212° by one lb. of Dry Coal.	Relative efficiency in per cent. Cumberland = 100.	Cost of coal per ton	Fuel cost of evaporating 1,000 lbs. of water from and at 212°.	Relative efficiency in per cent. measured by cost to evaporate 1,000 lbs. Cumberland = 100.
Cumberland	11.04	100	$3.75	$0.1698	100
Anthracite Broken	9.79	89	4.50	0.2297	74
Anthracite, Chestnut	9.40	85	5.00	0.2660	64
Two parts Pea and Dust and one part Cumberland	9.38	85	2.58	0.1375	123
Two parts Pea and Dust and one part Culm	9.01	82	2.58	0.1432	119
Anthracite, Pea	8.86	80	4.00	0.2259	75
Nova Scotia Culm	8.42	76	2.00	0.1187	156

The possible savings with low grade fuels and mechanical draft are still further evidenced by the accompanying table, which shows for a 1000 horse-power plant the annual saving, based on 312 days of 10 hours each, which would result from the substitution of a cheaper fuel for say Cumberland coal, costing, in round figures, $4.00 per ton, and evaporating 11 pounds of water from and at 212°, per pound of coal. Under these conditions, the annual fuel expense would be $19,568.00. If the assumption be made that a coal costing $2.50 and evaporating only 9 pounds of water is substituted, the annual saving would be $4,621.00. The fuel cost of operating the fan, even if the exhaust steam was not utilized, and it required 1½ per cent. of the total coal burned, would be only $224.00, and, if this is charged against the saving, it would still amount to $4,397.00, a sum sufficient to show a most creditable reduction in operating expense, even if there was also charged against it any additional labor and the fixed charges on a complete equipment of special

ANNUAL SAVINGS RESULTING FROM BURNING CHEAPER FUEL IN 1000 H. P. BOILER PLANT.

Water evap. from and at 212° per lb. of coal.	Cost per Tos. $0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
11.00										5474	4892	3669	2446	1225	0000
10.50									6115	4770	4183	2912	1680	349	
10.00							8240	6823	5407	3891	3424	2079	734		
9.50						9105	7610	6115	4821	3126	1631	136			
9.00					10074	8491	6809	5326	3743	2160	578				
8.50				11180	9478	7797	6115	4483	2752	1070					
8.00			12393	10569	8865	7012	5218	3424	1630						
7.50			11881	9939	8057	6115	4183	2272	350						
7.00	15724	13803													

appliances for burning the lower grade fuel. In general practice, a mere change of grate bars is sufficient to adapt a boiler for burning almost clear yard screenings by means of mechanical draft.

A reduction of over $125.00 per week, equivalent to $6500.00 per year, has been made in actual practice in the case of a boiler plant of 1000 horse-power, by the introduction of mechanical draft, and the burning of

buckwheat and yard screenings with a slight mixture of Cumberland.

Possible savings of course depend primarily upon the relative costs of fuels; in other words, upon the geographical location of the plant. The higher the scale of prices the greater the possible savings.

With the increasing interest in the possible reductions in operating expense, more attention is being turned to the mechanical stoker, both as a means of more economically and of more uniformly supplying the fuel to the furnace. As incidental to its success, positive and automatically regulated draft is a necessity. This is particularly true in the case of the modern forms of under-feed and chain-feed machines. The forced-draft method of mechanical draft is generally employed and the necessary arrangements are of the simplest character.

Of the advantages of mechanical draft which are purely qualitative in their character, much might be said, but time will not permit. It must suffice to merely refer to the more prominent points of advantage.

When the fan is employed for draft production, the steel plate construction, the comparative lightness, the portable character, and the absence of heavy foundations, render extremely simple its adaptation to the exact requirements. Being portable, it is also salable and hence an asset of real value as compared with the chimney. It may be used either for forced or induced draft and placed where it will occupy no valuable space. It may be operated by direct-connected or belted engine or motor, and so proportioned as to produce any desired draft pressure.

In operation, the fan is both positive and flexible, independent of the weather, but capable of regulation to the finest degree and of adjustment to the necessities of the fire at any particular moment. A mere increase in the cut-off of the fan engine brings about a result secured with a chimney only at the expense of adding to its height, while a change in the fan speed alters both the volume handled and the intensity of the draft produced.

If this discussion of the influence of mechanical draft on boiler efficiency has rendered clear the factors concerned, it has with equal force shown that this influence is beneficial—in many ways markedly so. In the light of this fact, the present active interest in the subject points to the future consideration of mechanical draft as a most important factor in steam-boiler practice.

Advantages of Coke over Coal as a Fuel for Generating Steam.

Paper read by Arthur C. Freeman, Waltham, Mass., at the Montreal meeting of the New England Cotton Manufacturers' Association.

The item of fuel being one of the large items of expense entering into the cost of manufacturing, is necessarily one in which every manufacturer is interested.

The most important fuel in use at the present time is coal. The cases where wood is used are exceptional, and becoming more so as the population increases, and timber becomes scarce and more in demand for structural purposes.

It is only recently that the question of coke has been seriously considered by manufacturers in New England, although large quantities are annually consumed in the West, where it enters into competition with both hard and soft coals.

One of the reasons why this fuel has not been more extensively used in New England is possibly due to the fact that it is only recently that its manufacture has been attempted on a commercial scale. The heretofore high cost has also been one of the reasons for its no more general adoption.

Coke, as generally understood, is carbonized coal, or the carbon of the coal left in the ovens after expulsion of the volatile substances by heating, or as it is generally called, coking. The volatile substances, viz: tar, pitch, gas, ammonia, etc., are smoke producers.

About one-third of the weight of the coal is thrown off in the coking process; the carbon in one and one-half tons of coal is therefore largely represented by the carbon in one ton of coke.

The manufacture of coke is generally carried on in heaps, retorts, or ovens, and is spoken of as gas or oven coke, referring, of course, to its mode of production. In the case of oven coke, the object is not so much to prepare coke as it is to obtain gas, tar and various other products.

In the present day, coal is converted into coke almost exclusively in ovens constructed for this purpose, it having been found that by the use of ovens the operation is more readily conducted, and that a larger quantity and better quality are obtained.

Coke is prepared for various purposes: For increasing, or rather concentrating the quantity of carbon in the coal, and thus obtain a fuel which will yield a more intense heat than coal. For the purpose of converting coal into a fuel which does not become pasty when ignited. Coal in consequence of this property being unsuitable for blast, cupola, or other furnaces.

Well burnt coke, or oven coke, is a hard, uniform, compact, solid mass, difficult to break, and not honeycombed, or very porous. Its color is black-gray or iron-gray, with a dull metallic gloss. Good coke should contain very little sulphur.

When discharged from the ovens, coke consists chiefly of columnar pieces about eight inches long and four or five inches thick, with smaller pieces mixed in. By a specially designed crusher, it is then broken up into various sizes, as egg, nut, and pea. For boilers it is generally used as it comes from the ovens.

The advantages claimed for this fuel are that it is clean, there being no dust, no dirt, no smoke, and but few ashes. It kindles quickly, makes the hottest fires, is easily controlled, and requires but little draft.

It does not clog the boiler flues, thus obviating the frequent and expensive cleaning. This secures the complete utilization of the heat value of the fuel. It is smokeless. When looking at the stack of a boiler fired by coke, it is impossible to determine whether the boiler is running or not. This absence of smoke, especially around bleacheries and other places where expensive and fine work is carried on, and in thickly populated communities, where soot and smoke are so destructive, is a matter of no little importance.

Its general use would probably do away entirely with the smoke nuisance encountered in some of our large cities, and would add immeasurably to the comfort of those who travel by steam where coal is used.

From a hygienic standpoint the health of citizens must in a measure be impaired by breathing in this soot. With the volatile substances removed, the dangers from spontaneous combustion are entirely eliminated; and it can be kept with safety anywhere, and for any length of time.

Coke is a fuel unlike bituminous coal in its composition, and therefore requires somewhat different treatment when used in place of that fuel. It resembles hard coal, and should be fired in a somewhat similar manner. Some changes in the ordinary grates will probably be necessary to burn coke with maximum economy and convenience, but it can be burned on ordinary grates.

The following suggestions will be found useful in learning its management:

1st. In building the fire, put the coke on lightly and often, until the fire is seven or eight inches thick. An eight-inch fire will make steam much better than a heavier one.

2d. It is better not to disturb the top of a coke fire, therefore when firing, spread the fuel evenly, so as to keep the fire level.

3d. Shaking bars are very suitable for burning coke, and they should be shaken frequently. If dead bars are used, a light poker should be run under the fire frequently to keep clinkers from clinging to the grate, and to keep

them broken up. A poker is better than a slice bar for this purpose, as it is lighter and more easily handled. The object is not to bar up the fire, but to detach small pieces of clinker, and prevent them from forming and running together.

4th. It is advisable to keep water in the ash pit, or to introduce a jet of steam.

The capacity of the coke appears to correspond to that of antracite coal of similar size, and to be about 80 per cent. of the capacity of the best soft coals, such as Cumberland, Pocahontas and New River. By capacity is meant the ability to evaporate steam with a given grate area and draft pressure, irrespective of the economy.

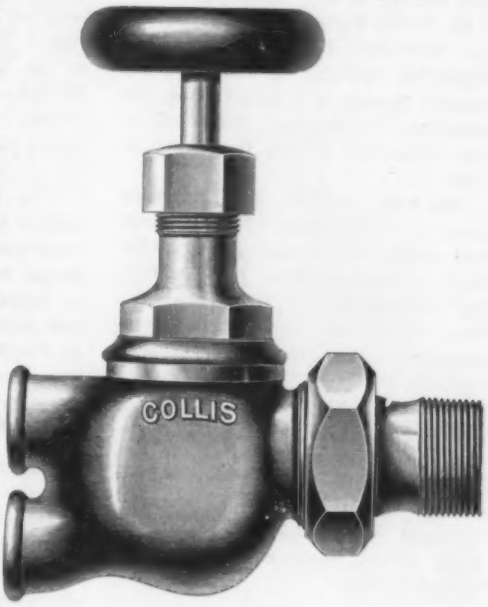
The Collis Valve.

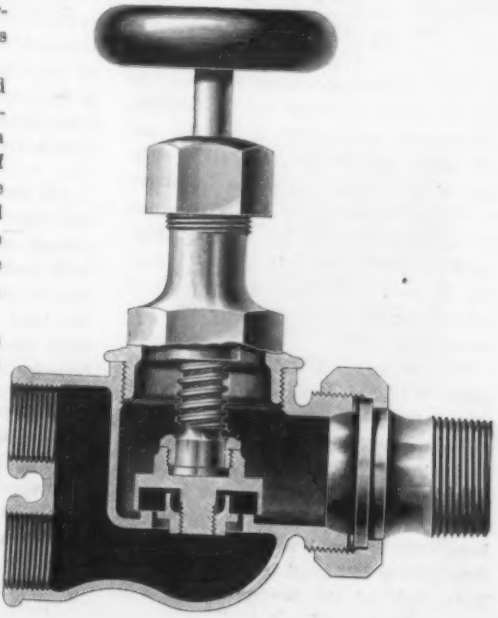
The Collis valve is not a new or untried device, but has long been experimented with by the ablest men in the heating business, and in placing this valve on the market Jenkins Bros., New York, are offering a valve whose merits have been proved.

This valve when attached to a radiator enables a perfect circulation of dry steam at all times up to the seat of the valve. Only one valve is required for a radiator and the circulation will be active and positive, whether the valve is open, partly open, or closed.

Heating surfaces can be warmed much more quickly and effectively when steam is turned on at the radiator, and the usual hammer which takes place when steam is turned on is prevented. Radiator connections can be neatly and mechanically run above the floor and attached to the valve without making them unsightly.

With this valve there is a complete circulation in the apparatus when radiators are disconnected, and they can be disconnected and reconnected





without shutting down the whole system. This will be found very convenient when using radiators for temporary heating in new buildings, etc.

The Collis valve can be adopted for use with any of the automatic heat regulating systems by removing the regular bonnet and substituting the diaphragm bonnet and trimmings of the regulating system that may be used.

This valve is made in the following sizes: 1¼" to radiator, ¾" x ¾" steam and return, which will supply radiators or coils up to 60 sq. ft. of surface. 1½" to radiator, 1" x 1" steam and return, which will supply radiators or coils up to 100 sq. ft. of surface. 2" to radiator, 1¼" x 1¼" steam and return, which will supply radiators or coils over 100 sq. ft. of surface.

These valves are made of the best steam metal, are extra heavy, contain all the improvements and are manufactured, tested and inspected in the same careful manner as our regular radiator valve.

The Economy of Using Turbines at Full Gate.

Paper read by Frank P. Vogl, Claremont, N. H., at the Montreal meeting of the New England Cotton Manufacturers' Association.

The following memorandum is given as an example of the several advantages accomplished by the use of water wheels at full gate. The use of the steam engine as auxiliary to water wheels gave an easy means of making the test by the indicator cards, showing the value of the use of the water at full head on one pair of wheels, rather than dividing it between two pairs.

The Monadnock Mills have two pairs 54 inches, horizontal wheels under 20-foot head and giving, at full capacity, sufficient power to operate the mills. As auxiliary power a 24-inch by 48-inch Brown engine is used and this supplies enough power to keep water level with top of dam; thus giving full head to water wheels. Both pair of the water wheels and the engine are belted on to the same main shaft and the engine does the regulating when used, the gates of wheels being hoisted just enough to keep the water level with top of dam. June 9, 1899, with both pairs of wheels in use the indicator showed engine 120 horse power. With one pair of wheels in use the indicator showed engine 83½. Showing a gain by using all the water on one pair of wheels of 36½ horse power. This shows a gain of 30 per cent. in power required by steam and a consequent better use of the water. I submit the foregoing as being an example of actual use and which may be of value in putting in wheels, where used with auxiliary steam power.

Caution Against Freezing.

Manufacturers should give immediate attention to their pipes and hydrants for winter protection against freezing, also to all elevated tanks for sprinkler supplies which are exposed. In these tanks the water should either be kept above the freezing point, or a slow circulation should be maintained through them. If the latter course is adopted, the circulation should not be carried through the sprinkler pipes themselves, in which the water should be kept as nearly in a dead condition as it is possible to keep it, as circulation increase the danger of oxidation in the pipes.

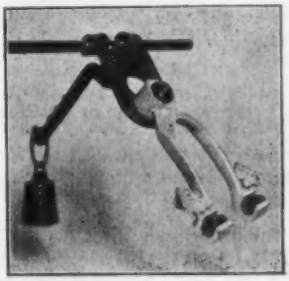
—It has been found by experience that the soluble soaps prepared with potash, or the soap made from oleic acid and caustic soda, give the best results as regards feel and lustre. For the best qualities of wool, olive oil soap, prepared from gallipoli oil, is largely used.

—When the Stamp Act came, in 1766, it served as a tremendous stimulus to the cloth industry. The pride of the colonists was touched, and the non-importation covenants, which were everywhere entered into, were naturally followed by renewed efforts to supply home-made cloths.

The New Ameledema Worsted and Silk Tension Saddles.

The advantage of the Ameledema oilless bearings for this particular phase of textile mill work is important, and from the fact that worsted manufacturers are alert to take advantage of any device which improves their product, there has already been an extended introduction of the saddle, which has given much satisfaction.

The illustrations show the special features of the new saddle very clearly. It will be noticed that the locking device, which retains the bushings, also prevents the lint and fly from reaching the journals. This method of construction is an important feature, and when coupled with the oilless bearings, makes a tension saddle which



presents great advantages. When it is considered that the pulleys cannot jump out; that it is not necessary to use lubricant of any kind; that on account of the entire absence of moisture there is no collection of fly or dirt; no heating; the saving of bands and saving on the pulley shaft it will be seen that here is a device which commends itself to the investigation of manufacturers who are looking for good results and economy.

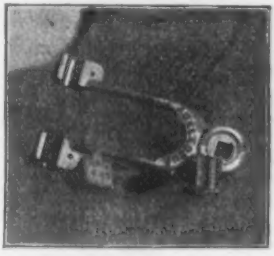
Among the worsted spinners who are using the Ameledema saddle, after a careful test of their merits, are the Mt. Vernon Mills, John & James Dobson, S. B. & B. W. Fleischer, Tracy Worsted Mills, George Campbell & Co., E. T. Steel & Co., Yewdall & Jones Bros., Bradford Mills, Griswold Worsted Co., Jamestown Worsted Co., Highland Worsted Co., and the Trenton Worsted Co.

The same principle with slightly different form of construction is employed for silk manufacture.

It being the policy of the company to sell their products entirely on their merits, they request those using ten-

sion saddles to send for one or more, which will be gladly loaned for trial, for a period of from thirty to ninety days, as may be desired, entirely free of charge, after which time they may be returned to the company, if so desired. Samples are sent ready to receive own pulleys and take the place of saddles now in use, without alterations of any kind being required.

Of course the first and most important of all the advantages of the Ameledema bearings, not only for this, but for all purposes where they are employed, is dispensing with oil or lubricant of any kind, which is in itself a valuable feature, but really secondary to the improvement of the



product through absence of dirt and oil spots.

Among other important applications of these bearings to textile machinery, are their use in mule and twister spindle bearings and in all sorts of loose pulleys and sewing machine transmitters.

DYEING DEPARTMENT.

Dye Recipes for December.

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16 page pamphlet, in convenient form for preservation. Subscription price for the TEXTILE WORLD with the Dyers' Supplement is $3.

Recipe No. 177.

Blue on Cotton Yarn.

Direct Blue 3 G on 100 pounds cotton yarn.

Prepare dye bath with

10 lbs. Common Salt.
5 lbs. Direct Blue 3 G.
(O. S. Janney & Co., 8-10 Letitia St., Philadelphia, Pa.)

Enter the material (which has been previously wetted out) at 160° F. Work while bringing to a boil and continue the boiling at least ¾ of an hour.

Washing after dyeing is scarcely necessary and the dye bath being practically exhausted, is not kept for a standing kettle.

The dyestuff is very soluble in water, goes on the fibre evenly, producing a clear shade of blue that is quite fast. It is applicable to the dyeing of what is commonly known as baby, or sky, blue, either in yarn or hosiery.

Recipe No. 178.

Orange on Cotton Yarn.

Orange S B on 100 pounds of cotton yarn.

Prepare the dye bath with

20 lbs. Common Salt.
2½ lbs. Orange S B.
(New York & Boston Dyewood Co., 55 Beekman St., New York.)

Enter yarn at 180° F., bring to a boil and dye at this temperature for one hour.

Orange S B goes on the fibre evenly, has excellent penetrating properties, and produces a rich shade of orange yellow. (See recipe 189, this issue.)

Recipe No. 179.

Blue on Flannel.

The Amend Mordanting Process on 100 pounds worsted yarn.

(Controlled by the Amend Process Co., 205-211 Third Ave., New York.)

Prepare bath for mordanting with

6 lbs. Acetic Acid, 30%.

Turn one-half hour at 140°.

Then add to same bath a solution of

1 lb. Chromic Acid.

Turn one-half hour, and let temperature drop.

Add to bath

6 lbs. Bisulphite of Soda.

Bring temperature up to 140°, while turning, and turn one-half hour at that heat. Rinse off.

Dye in a bath of

10 lbs. Chrome Blue, paste.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)

It does not take so long to mordant or dye, as according to the old way of mordanting with bichromate of potash and tartar. The goods are left in a very much better state, as it requires no heat, to speak of, in the mordanting, thus saving steam. Also, the yarn, cloth, or stock can be handled much easier and quicker. Brighter shades are produced than if mordanted in the old way. It also saves in dyestuffs, and dyes deeper and faster colors, both to light and soaping. The dye is also assisted in working on the fibre more level.

Recipe No. 180.

Black on Cotton Yarn.

Ebonite Black R on 100 pounds of cotton yarn.

Prepare the dye bath with

25 lbs. Common Salt.
6 lbs. Ebonite Black R.
(A. Klipstein & Co., 122 Pearl St., New York.)

Enter yarn at 180° F., bring bath to a boil and dye at this temperature one hour.

With this percentage of dyestuff, Ebonite Black R produces a jet black with considerable body. It goes on the fibre evenly and its penetrating properties are excellent.

Recipe No. 181.

Red on Cotton Yarn.

Benzo Red S G on 100 pounds of cotton yarn.

Prepare dye bath with

3 lbs. Benzo Red S G.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)
15 lbs. Glauber's Salt.
1 lb. Soda Ash.

Enter yarn at 180°, bring to a boil and dye at this temperature for one hour.

Benzo Red S G is a new product. It differs from most of the Benzo reds, in that it is fast to acids.

Recipe No. 182.

Blue on Cotton Yarn.

Zambesi Indigo Blue R on cotton yarn.

Prepare dye bath with

3 lbs. Indigo Blue R.
(Berlin Aniline Works, 72 Front St., New York.)
25 lbs. Common Salt.

Dye and diazotise same as in recipe 192 (Zambesi Black D), then develop in a bath of

¾ lb. Beta Naphthol.
¾ lb. Hydrochloric Acid.

Stir until the Beta Naphthol is all dissolved and then add

9 lbs. Soda Ash.

Wash and dry.

A blue is thus produced which is fairly fast to light and exceptionally fast to washing.

Recipe No. 183.

Black on Cotton and Wool Mixed Goods.

Half Wool Black B on 100 pounds of mixed goods.

Prepare dye bath with

25 lbs. Glauber's Salt.
5 lbs. Half Wool Black B.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)

Enter material at 150° F., bring gradually to a boil and boil for at least one hour.

Half Wool Black B is a new product for mixed goods. It is particularly suitable for cotton and wool mixed goods, and possesses the peculiarity that by continued boiling the cotton grows darker faster than the wool. This is a valuable property in half wool dyeing.

Recipe No. 184.

Blue on Cotton Yarn.

Prepare dye bath with

30 lbs. Common Salt.
3 lbs. Diamine Azo Blue R R.
(Wm. J. Matheson & Co., Ltd., 182 Front St., New York.)

Enter yarn at 170° F., bring to boil and boil one hour. Take out and rinse. (See recipe 162 in November Supplement, for a blue with Diamine Azo Blue R.)

Recipe No. 185.

Blue on Cotton Yarn.

Diphenyl Blue 2 B on 100 pounds of cotton.

Prepare the dye bath with

20 lbs. Common Salt.
3 lbs. Diphenyl Blue 2 B.
(John J. Keller & Co., 104-106 Murray St., New York.)

Enter yarn at 130°, bring to a boil and dye at this temperature one hour with sufficient working to insure evenness.

Diphenyl Blue 2 B goes on the fibre evenly, and produces a bright, handsome shade of blue. (See recipe No. 82, June Supplement, for a dark blue on cotton yarn from Diphenyl Blue B.)

Recipe No. 186.

Black on Worsted Yarn.

Acid Black 4 B on 100 pounds of worsted yarn.

Prepare dye bath with

4 lbs. Sulphuric Acid.
20 lbs. Glauber's Salt.
4 lbs. Acid Black 4 B.
(Sykes & Street, 85 Water St., New York.)

Enter yarn at about 150° F., bring slowly to a boil and dye at this temperature for at least one hour.

Acid Black 4 B goes on the fibre

slowly, thus insuring evenness. It produces a very pleasing shade of black, and answers all the requirements of an acid dyestuff.

Recipe No. 187.

Black on Cotton Yarn.

Oregon Black B on 100 pounds of cotton yarn.

Prepare the dye bath with

20 lbs. Common Salt.
7 lbs. Oregon Black B.
(Anchor Color Manufacturing Co., 462 Cherry St., New York City.)

Enter yarn at 150°, raise to boil and dye at this temperature for one hour.

The amount of dyestuff may be reduced to five pounds in a second dyeing.

Oregon Black B gives a very even and pleasing shade of black upon cotton. It may also be used on cotton and wool mixed goods. (See recipe 155, October Supplement, for a black on cotton yarn from Oregon Black.)

Recipe No. 188.

Blue on Cotton Yarn.

Direct Blue 2 R on 100 pounds cotton yarn.

Prepare the dye bath with

3 lbs. Direct Blue 2 R.
(O. S. Janney & Co., 8-10 Letitia St., Philadelphia, Pa.)
20 lbs. Common Salt.

Enter yarn at 160° F., turn while raising the temperature to the boil and continue boiling for one hour. Wash and dry.

Subsequent dyeing requires only ⅔ the original amount of dyestuff, if the same bath is used.

Direct Blue 2 R gives fair shades of navy blue as a self color and in combination with black will produce a great variety of shades, the same being fairly fast to light and washing. Direct Blue 2 R is applicable to union goods as well as all cotton.

Recipe No. 189.

Orange on Cotton Yarn.

Orange S on 100 pounds cotton yarn.

Prepare dye bath with

20 lbs. Common Salt.
2½ lbs. Orange S.
(New York & Boston Dyewood Co., 55 Beekman St., New York.)

Enter yarn at 180° F., bring to a boil and dye at this temperature for one hour.

Orange S goes on the fibre evenly, has excellent penetrating properties, and produces a rich shade of orange yellow. (See recipe 178, this issue.)

Recipe No. 190.

Blue on Woolen Cloth.

Indalizarine Blue T B on 100 pounds woolen cloth mordanted with chrome and tartar.

Mordant as follows:

3 lbs. Bichromate of Potash.
1½ lb. Bitartrate of Potash.

Enter cloth at 160° F., work while raising to the boil and boil for one hour.

Wash and dye in a bath of

10 lbs Indalizarine Blue T B.
(A. Klipstein & Co., 122 Pearl St., New York.)
5 lbs. Acetic Acid.

Add the acetic acid to the dye bath at 120° F., and stir the dyestuff into the bath. Enter the cloth and turn while raising to the boil. Continue the boiling one hour. Wash and dry.

Indalizarine Blue T B is much brighter and cheaper than ordinary Alizarine Blue and fully as fast as the latter.

Recipe No. 191.

Light Brown on Cotton Yarn.

Cachou Brown T on 100 pounds of cotton yarn.

Prepare dye bath with

2 lbs. Soda Ash.
50 lbs. Common Salt.
5 lbs. Cachou Brown T.
(Sykes & Street, 85 Water St., New York.)

Enter yarn at 180° F., bring to boil and dye at this temperature for one hour.

Cachou Brown T belongs to the Cachou de Laval Thiocatechine group, but requires no fixing bath. It gives a shade fast to light, air and soap. If the bath is used over again, the amount of salt is reduced ⅓, while the amount of soda ash remains the same.

Recipe No. 192.

Black on Cotton Yarn.

Zambesi Black D on 100 pounds of cotton yarn.

Prepare dye bath with

50 lbs. Glauber's Salt.
2½ lbs. Soda Crystals.
5 lbs. Zambesi Black D.
(Berlin Aniline Works, 72 Front St., New York.)

Enter yarn at 130° F., give two turns, put on steam, bring bath to a boil, and boil one hour. Lift and wash.

Then enter the yarn into a cold bath of diazotising solution made of

7½ lbs. Muriatic Acid.
3 lbs. Nitrite of Soda.

Enter yarn cold and work for 15 minutes, then work for 15 minutes in a developing bath made up as follows:

1 lb. Nerogene D.
(Berlin Aniline Works, 72 Front St., New York.)

1 lb. Muriatic Acid 32° Tw.

Stir until the Nerogene D is completely dissolved, then add

9 lbs. Soda Crystals.

Then wash and dry.

For a second dyeing only 4% of dyestuff is necessary and only 25% of Glauber's Salt.

For second diazotising bath

1 lb. Nitrite of Soda.
4 lbs. Muriatic Acid.

And second developing bath

¾ lb. Nerogene D.
¾ lb. Muriatic Acid.
3½ lbs. Soda Crystals.

Goods dyed in this yield a jet black with an intense blue bloom, which is fairly fast to light and especially fast to washing.

New Dyes.

We present in this issue (referring more particularly to our Dyers' Supplement), a number of new colors that have been put upon the market, with the expectation that they will receive the commendation of dyers. Wherever they have been used, we are led to believe that they have been received with much satisfaction.

O. S. Janney & Company, of Philadelphia, show their Direct Blue 3 G in recipe 177, for the production of a blue on cotton yarn. This dye is very soluble in water, and goes on the fibre slowly and evenly, producing a bright and pure shade of blue, whose tone is slightly on the green cast. This blue stands light and washing exceedingly well, and is especially adapted for the production of sky blue tints. The shade produced is made much clearer and brighter when dyed on cotton which has been previously bleached. This house also shows its Direct Blue 2 R, in recipe 188, for the production of a blue on cotton yarn. This dye, together with the previous one, belongs to a class of one-dip cotton dyes. Direct Blue 2 R, like Direct Blue 3 G, is very soluble in water, and goes on the fibre slowly and evenly, producing a very red shade of blue, which is fairly fast to light and washing. It can be made very much faster by a subsequent treatment, at the boil, in a bath of 15 per cent. of blue vitriol. It is also good as a self color, or can be used in combination with black or any of the salt dyeing colors.

An attractive shade of orange on cotton yarn is obtained by following recipe 178, in the use of Orange S B, furnished by the New York & Boston Dyewood Company, New York. This house also furnishes, in recipe 189, their Orange S, for a shade of orange on cotton yarn. These colors are very simple, applied in the ordinary way for substantive dyes, and common salt is generally used as a mordant, as noted in the recipes. The colors are bright, clean products, and desirable both in straight shades and combining with other substantive dyes.

Ebonite Black R is a one-dip dye for cotton, shown in recipe 180, for a black on cotton yarn. This dye is obtained from A. Klipstein & Company, New York. It will also dye a mixture of cotton and wool. It is represented as one of the fastest of all the one-dip colors, to fulling, and is largely used in dyeing raw stock, for mixing with wool when the latter has to be submitted afterwards to scouring operations. It is very fast to light. This house shows in recipe 190 for a blue on woolen

cloth, their Indalizarine Blue T B, which is a new blue similar to alizarine blue, in shade, but faster both to fulling and light, especially in very light shades.

Farbenfabriken of Elberfeld Company, New York, represent their Benzo Red S G in recipe 181, for a red on cotton yarn. This is a new benzidine dyestuff, the shades of which are distinguished for their great fastness to acids, and when discharged with tin or zinc powder, a fine yellow is obtained, whereby fashionable designs can be produced. This house also shows, in recipe 183, their Half Wool Black B on cotton and wool mixed goods. One of the principal features of this dye is that the longer it is boiled, the darker the cotton becomes. This is not always the case with blacks for half wool, as continued boiling, as dyers no doubt are aware, often strips the color from the cotton and at the finish the wool is darker in shade than the cotton.

John J. Keller & Company, New York, show in recipe 185, their Diphenyl Blue 2 B, for a blue on cotton yarn. This dye belongs to the ordinary direct dyeing cotton blues, inasmuch as it develops on the fibre very slowly, level dyeings are assured. On account of its brightness and penetrating qualities, it is an excellent color for combination shades.

We show in recipe 186 a black on worsted yarn, produced by the use of Acid Black 4 B, obtained from Sykes & Street, New York. This dye is a wool color, and is usually dyed with the addition of say five per cent. acetic acid in the bath. Some consumers use it with sulphuric acid and Glauber's Salt, as noted in our recipe, in the usual manner for acid colors. Many, however, prefer acetic acid, and the product is then said to have an advantage of gaining resistance to light, air and milling, by passing through a weak solution of bichromate of potash, after dyeing. This is usually done cold.

—The first broadcloths made from merino wool in the United States were manufactured at Pittsfield, in 1804, by Arthur Scholfield.

Dyeing of Mercerized Cotton.

There is still a good deal of misconception as to the best methods of making sure of uniformity in dyeing large parcels of mercerized cotton, whether yarn or piece, and the voluminous literature of the dyehouse is silent on the subject. It is true that the well-worn string of the greater receptivity for dye conferred on the cotton by mercerization is twanged religiously, but the fact that the very circumstance makes the dyeing of such cotton all the harder is scrupulously not alluded to. Inasmuch as the first portions of the cotton which come into contact with the dyebath greedily absorb more dye than it is desirable they should get, and the later portions have in consequence to be satisfied with less than they ought to receive, previous mercerization of the cotton is an unfailing recipe for obtaining unlevel shades, unless special precautions are taken. Hence not only is it harder to secure uniformity with mercerized than with unmercerized goods, but the difficulty is felt equally for all shades with the former instead of principally with the lighter ones, as is the case with ordinary cotton.

The first precaution, then, to be taken in dyeing mercerized cotton is to make a proper choice of dyestuffs, and to select the lowest among them, and also in using two or more dyes, at the same time not to combine those which differ markedly in their affinity for the fibre. The best criterion of this affinity is solubility. This is greater as the affinity is greater, and vice versa. In comparing the solubilities, water should be used containing the same proportion of Glauber's salt, etc., that will be used in the dyeing operation. Other and more important precautions are connected with the volume of the bath, its temperature, and on the proportion of salts or soap added to it. The more of alkaline and the less of neutral salts are in the bath and the lower its temperature, the slower and leveler the dyes will be. If too the bath must be heated,

as long a time as possible should be occupied in attaining the highest temperature.

It might be thought that by realizing two or three of these four conditions very thoroughly, the others might be dispensed with. This is, however, very rarely the case. It is true that a few dark shades can be dyed with a bath compound in the same way as the unmercerized cotton, provided the goods are entered at a very low temperature and very slowly heated up, and when great care has been exercised in picking the dyes, but these cases are few and far between, and do not exist for light shades. Most dyes require the strictest attention to all the precautions.

As it is impossible to make all these fine discriminations in practice, it is best to enter the goods for all shades under the most favorable conditions of low temperature, etc., and if any addition to the bath or higher temperature is required, to have recourse to it later. In this way the conditions requisite are gradually learnt by experiment for each particular case. When this has been done, tentative measures need no longer be resorted to, and it becomes possible to dye mercerized material as certainly and quickly as unmercerized. It may here be mentioned that phosphate of soda, turkey-red oil, waterglass, borax, etc., though much vaunted, give no better result that Glauber's salt, soap and soda, and much is gained in expense and in simplicity of procedure by neglecting them. One or other of them may answer well in some special case, but most of the dyes which require them can be dispensed with. The Glauber's salt used should always be in crystals, as the calcined commercial article varies greatly in composition, and is often contaminated either with free acid or free alkali.

Very light shades, such as cream, pale pink, pale blue, etc., are dyed on yarn as follows: The bath is made from forty to fifty times the weight of the yarn. It is made to feel soapy with Marseilles soap if soft, with soda if hard, and to be fairly alkaline. The goods are entered wet at 100 deg. F.. and worked for from ten to fifteen minutes. Then lift, add the dye in solution through a hair sieve, enter again and work till finished. No Glauber's salt or common salt is necessary, and the initial temperature of 100 deg. F. must not be exceeded during the operation, and the heat should rather be somewhat less. This may require the use of rather more dye, but it prevents all chance of want of uniformity. If soap is used no rinsing is necessary. If the yarn is required to have a crisp, silky feel, as is usually the case, this is effected by subsequent soap and acid baths, repeated until the desired result is attained. It is better to use acetic than sulphuric acid, as then no rinsing is wanted. But in that case sharper drying is needed to volatilize the acetic acid entirely. The more thoroughly this is done the better and more permanent the feel.

Fabrics require different treatment as the baths are relatively much smaller; the operation is carried out on the jigger, or better on the padding machine. The yarn vats so warmly recommended by certain dye-makers are not suitable for this purpose.

On the padding machine from five to seven gallons or so of bath will be enough for 220 yards of material a yard and a half wide. In such a small bath the various precautions must be very rigorously observed. No artificial heat may be used and the bath must be strongly alkaline. The pressure of the rollers is a great help in the process, as it not only accelerates the penetration of the dye, but aids leveling by driving out all excess of dye immediately. This action of the rollers is the more valuable that it is effected without supervision, and on account of it the padding machine should invariably be used for light shades. The rollers also improve the finish of the goods. The goods must undergo a preliminary soaking in warm soap or soda. Two passages through this are advisable at 100 deg.

F. if the stuff is wet first, but at 175 deg. if it is dry. The goods are then passed through a cold soap or soda bath to cool it. The dyebath is made up with soap or soda and about one-fourth the total quantity of dye that will be used ultimately, and the goods are passed through it cold. The bath is then made up to its original strength and volume, with more dye and soap and water, and the goods are again sent through. After this second passage a sample of the piece is taken, and from an examination of it how much more dye will be required is estimated. A third and final bath is then made up with soda, etc., and the goods are passed through again, and again sampled, and so on till finished. Here, again, if soap has been used no rinsing is required. Crisp feel is got as with yarn and with the same padding machine that was used for the dyeing. As only small quantities of bath are wanted in all these padding machine operations, soft water can and should always be used. Hard water can be softened by boiling with a little caustic soda, or condensed water can be used.

The directions which have been here given for quite delicate shades are also suitable for ordinary light shades, except that the temperature used should be made higher if more dye remains in the bath than goes on to the fibre. Whether this is so or not may be ascertained by comparing the colors with the eye, and a little practice soon enables the already trained eye of the dyer to tell. Every rise in the temperature causes a darkening of the shade, and a corresponding diminution in the dye contents of the bath. The heating is discontinued when the dye appears to be about equally divided between fabric and bath. This generally happens at about 140 deg. F. If it is not reached, more dye must be added.

Even for darker shades this comparison between the color of the bath and of the fabric cannot be omitted, but with them the proportions between the two must be different. In proportion as the shade darkened, so must the fabric be colored more and more deeply than the bath. This requires a temperature increasing with the darkness of the shade, and varying from about 175 deg. F. to the boiling temperature, and also the addition of either Glauber's or common salt. For the darker shades on fabrics, the padding machine is unsuitable, for on the one hand the short duration of contact between dye and material requires the employment of a larger quantity of dye, and on the other the small volume of liquid present can scarcely keep the larger quantity in solution. Hence the jigger is exclusively used when dark shades are to be used.

In every case never enter above 100 deg. F., and if further heating is necessary, heat slowly, and slower and slower as the final temperature is more closely approached.

If in spite of every care the dyes do not level, the cause is to be found, as a rule, in the way in which the mercerizing process was carried out. If more or less sharply defined spots appear, this is certain. We often hear it asserted that it makes no difference whether the stuff has been mercerized wet or dry, i. e., with or without previous soaking with water. But it does, for if yarn, in however loose a state, is passed through soda lye without previous wetting, there are always places which take the lye imperfectly. These places dye differently from the rest. The same thing is naturally still more likely to occur with woven fabrics. It often happens that, through badly constructed mercerizing machines or careless workmen, the stuff gets splashed with lye at wrong times, before or after the legitimate contact of it with the lye has taken place. Again, fabrics may contain foreign matters, such as size, which resist the action of the lye more or less in different parts of the fabric. As the mercerization affects the power of the fabric or material to take up dye, it is evident that no dye will level, do what you will, on unevenly mercerized

stuff. The remedy for these foreign bodies is to crab before mercerization. Although it may seem strange that this process should wear away things which would otherwise resist soda lye of 20 to 25 per cent. with some measure, at least, of success, it must be remembered that the lye is only used cold and only acts for a very short time, and crabbing is done with boiling soda and under powerful roller-pressure. It must never be forgotten that mercerized goods to be dyed must always be well boiled before mercerization, if in yarn, and crabbed if in the piece.—Dr. Kampe in the Dyer and Calico Printer.

Drying Textile Fabrics in a Vacuum.

Charles H. Fish, Dover, N. H., read a short but interesting paper before the Montreal meeting of the N. E. Cotton Manufacturers' Association, on the practical results obtained in the drying of textile fabrics with the assistance of a vacuum. Mr. Fish elucidated his paper with a number of illustrations of a machine to accomplish this work, the facts being based upon certain results of an extended test of a vacuum drying machine in operation at the Cocheco Manufacturing Company's print works.

The problem presented in carrying out these tests was the construction of an air-tight case connected with a vacuum pump, or other means of producing a vacuum, and means provided for passing the fabric into this chamber and out again without admitting sufficient air to interfere seriously with the maintaining of a vacuum.

In Mr. Fish's opinion, the problem has been satisfactorily solved. The machine upon which he operated had been in operation nearly eight months, running regularly with the rest of the works, and drying the cloths of various kinds as they came damp from the squeeze rolls of the washing machines.

Mr. Fish said that the cost for maintaining the vacuum is still somewhat of an unknown quantity. It is proven, however, that this cost will not be of great importance. If a steam pump is used, the exhaust from the pump is passed into the drying cylinders, but, wherever it is possible, a power pump, driven from the line shafting, would in all probability be preferable.

One square foot of heating surface under 20 to 21 inches of vacuum will dry about as fast as three square feet of heating surface on an ordinary dryer.

Another point greatly in favor of this system of drying, and which I think will be appreciated by all manufacturers, is the absolute freedom from steam or vapors and the almost absolute freedom from heat. All the vapors caused by the drying of the cloth are, of course, carried off by the pump, there being no possible way in which they can get out of the enclosed chamber. There will be a slight radiation from the iron casing of the machine, but, as the internal temperature is only from 150 degrees to 160 degrees fahrenheit, it cannot be of great annoyance. If necessary, the casing can be covered with some non-conducting material.

—O. C. King, of Meridian, Miss., Commissioner from that State to the Paris Exposition in 1900, has arranged for what promises to be a great novelty in the way of an exhibt. He has made arrangements with a party who has secured at the right season 500,000 selected full-grown cotton bolls, which will be sold at the Paris Exposition by original cotton field darkies as souvenirs of the American cotton exhibit. These will be the first cotton bolls ever shipped abroad, and they will be eagerly sought after by people who have used quantities of American cotton, but who have never seen it in its natural forms.

—Only the roughest kinds of homespun cloths were made in the United States, until the advent of the Scholfields in 1794. Unsuccessful as the Byfield enterprise was, it exercised a powerful and immediate stimulus, and led to an important differentiation in the industry.

QUESTIONS AND ANSWERS

Under this head we undertake to answer, free of charge, to the best of our ability, any pertinent inquiry pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

Dyeing Hosiery.

Editor Textile World:

Can you recommend a good book on dyeing hosiery, for a beginner, especially for dyeing black?

J. D.

There is no book devoted to this subject alone, but much has been written in this magazine that could be turned to much use by our correspondent. If our Dyers' Supplement and the Dyeing Department of the Textile World is carefully followed from month to month, a valuable mass of information on this subject would be eventually obtained. A dyer should have some general knowledge of chemistry and practice. Although an expensive work, costing $15, we would suggest obtaining the following: "Manual of Dyeing," by Knecht, Rawson & Loewenthal.

Angora Goats.

Editor Textile World:

Can you inform me if there is a book published in this country about the care and keeping of goats?

R. W. G.

There is no book published on this subject, supposing that our correspondent refers to the angora breed. There have been several valuable articles on the angora goat published in this magazine of late, to which we would refer. "The Angora Goat" by S. C. C. Schreiner, price $3.00, is a good book.

Hosiery Manufacture.

Editor Textile World:

If you have statistics at hand from which you can get the figures conveniently, or can estimate them, will you kindly give us information as to amount of capital invested in the manufacture of hosiery in the United States—value of annual production, and number of people employed, and oblige.

P. O. N.

The last available authoritative statistics are those of the census of 1890, which are, of course, very much out of date in view of the rapid growth of the hosiery business in the last decade. Moreover, even the statistics of that census did not classify the different branches of the knit goods trade, so that there are no distinct figures even for that year of the hosiery business alone. The 1890 census gives the total number of establishments at 800, with an aggregate investment of capital of $50,000,000, employing 61,000 hands. This, you will see, does not divide the underwear and the hosiery. When we come to the question of the value of production, however, they do classify, and we find the aggregate value of production of the knit goods industry to be $67,000,000 of which $19,000,000 is cotton and woolen hose and half hose and the balance underwear and other knit products. The hosiery production then was 28 per cent. in value of the total in 1890, and if we may assume this percentage (or for the sake of greater convenience, call it 30 per cent.) is the hosiery share of the capital invested and hands employed, we should find that in 1890, the capital invested was about $15,000,000. and the number of hands, 18,000. According to our last Directory, the number of knit goods establishments was approximately 1200, or an increase of 50 per cent. in the last 10 years. If we increase the figures of 1890 by 50 per cent., we thus arrive at the following statistics in answer to your question:

Amount of capital invested.....	$22,500,000
Value of product.....	30,000,000
Number of people employed, about	30,000

This is as near as we can come to answering your question with the figures that are available, and we doubt if it would be possible to obtain any more accurate figures until the next census is taken.

Uneven Yarn.

Editor Textile World:

Our carder wants to know if running fine wool over a card would make uneven work if carded immediately after having run merino stock for hosiery, and whether the reverse would be true.

L. H.

We cannot see why uneven work should be produced in either case, if the card clothing is thoroughly cleansed before a change is made from one kind of stock to the other. By merino, of course, we understand that the stock is

partly wool and partly cotton. If the cards are clean and in good condition, no uneven work should be made, assuming, of course, that the various cylinders are properly set.

Books Wanted.

Editor Textile World:

I am a second hand in the weaving room, and should like to get some books on cotton and calculations. What would you recommend?

J. A.

There are a number of excellent books on the manufacture of cotton, but the works by W. S. Taggart and Joseph Nasmith on "Cotton Spinning" are the latest and the best, covering the processes from the start to the weave room. If our correspondent wants books on weaving, we should have to recommend to him some other works. We think if he would obtain E. A. Posselt's work on "Calculations" that he would have as good a one as can be obtained.

Figuring the Amount of Yarn, Etc.

Editor Textile World:

Can you give me a good rule for figuring the amount of yarn wanted for a cut of cloth, both warp and filling, and how much wool to have carded for the same?

A. G.

Our correspondent has put to us a question that is nowhere near complete, and which would be impossible to answer even in a general way. We would suggest his obtaining Thomas R. Ashenhurst's book on "The Structure of Textiles and Calculations," if he can secure a copy. This book is out of print, we think, and if a copy can be obtained, it would be in some second-hand book store. He might write to the author, Jamestown, N. Y., and see if he has a copy. He would find E. A. Posselt's book on "Textile Calculations" a most excellent one. The best rule would be to make one from some concrete example relating to a specific piece of goods, by having some one take this and analyze it for his purpose.

Book on Combing.

Editor Textile World:

Can you tell me of a good book on the combing machine, that will give the necessary information about the setting, etc., of the different parts?

R. E.

Our correspondent does not tell us whether it is for wool or cotton. If for wool, we would suggest a work on "Wool Combing" by Burnley, and if for cotton, the works on "Cotton Spinning," by W. S. Taggart and by Joseph Nasmith.

Tweedales & Smalley Cotton Machines.

Editor Textile World:

I am running Tweedales & Smalley speeders and slubbers, and desire some information concerning the different gears on them, how to make the changes, etc.

F. H. E.

Write to H. G. McKerrow & Co., 31 State St., Boston, Mass.

Books Wanted.

Editor Textile World:

Can you give me the prices at which the following books can be obtained? Main's "Notes on Mill Construction;" Kidder's "Building Construction," vols. I and II; Linehan's "Treatise on Mechanical Engineering;" Kidder's "Pocket-Book;" Kent's "PocketBook;" Herzfeld's "Yarns and Textile Fabrics;" Grimshaw's revision of Nynstrom's "Mechanics."

R. D. L.

We quote the following prices: "Building Construction," vols. I and II, $3; "Treatise on Mechanical Engineering," $5; Kidder's "Pocket-Book," $4; Kent's "Pocket-Book," $5; "Yarns and Textile Fabrics," $3.50; "Mechanics," $3.50. "Notes on Mill Construction," by Chas. T. Main, can be obtained only of the author, whose address is Boston. We do not know the price.

Obtaining Cost of Manufacture.

Editor Textile World:

Will you give me a list of books, or the best book on the subject covering such information as a secretary and general accountant in a large cotton mill should know; how to arrive at the exact cost of making different kinds of goods, as practised by the best northern mills, giving the different calculations pertaining to manufacturing?

C. B. F.

There are two English works published with special reference to textile establishments, giving the principles of ascertaining the cost of manufacturing, but we should advise our correspondent to consult the Transactions of the New England Cotton Manufacturers' Association, especially No. 54, April 26, 1893, and No. 56, April 25, 1894, for articles, or papers, that were read on the methods of making up costs, and to No. 64, April 27-28, 1898, for an article on cotton yarn mill costs, and to the Textile World, October last, page 53.

Speed of Spring Needle Machines.

Editor Textile World:

At what speed should a machine of the Tompkins type, 20 inch cylinder, be run on balbriggan work?

Moon.

The proper speed at which to run the machine depends altogether on the kind of yarn you are knitting and may vary from 50 to 70 turns a minute and in some instances machines are run very much higher on flat work. We should think that with the usual hard twisted balbriggan yarn of good strength, on 24 gauge, a machine ought to be run from 65 to 70 turns per minute and do good work.

Flocking and Crimping.

Editor Textile World:

Will you kindly answer the following questions: What are the main points in the process of flocking cassimeres, satinets, etc.? How are the flocks made to adhere to the fabric? Is special machinery used, and what kind? Also what are the main points of the method commonly adopted for crimping or crisping English mourning crepe? How are the yarns for the same prepared, and of what are they composed?

G. E. W.

To give the process of flocking woolen fabrics would take up considerable space. There are no fixed rules how this is done, any more than can be said of other things in the finishing room. Everything has to be left to the judgment, based on experience, of the one that has the process in charge. Flocks are applied to the cloth on the back, and are forced into the fabric during the process of fulling or felting. The flocks are usually rags ground up to extreme fineness, and are thrown upon the cloth during the process of felting in a rotary fulling mill. There is no special machinery for flocking goods, more than fulling mills are oftentimes constructed with special reference to this process.

In regard to the method adopted for crimping crepe, we have to say that the crimp is produced by passing the fabric between heavy steel rollers, the surface of which is so indented as to produce the pattern desired. Mourning, or "hard" crepes are woven of hard spun silk yarn, in the gum, or natural condition.

Our correspondent has asked us for only one kind of crepe. We suppose that he knows that there are several varieties, some of them having peculiar methods of manufacture.

Angora Goats.

Editor Textile World:

My attention is called to a statement that appeared in your issue of September, 1897, and republished in the "Year Book" of the Department of Agriculture, Washington, to the effect that experiments had been made with angora goats in the state of Maine. I should like to know very much the result of this experiment.

E. E. R.

This matter has been frequently referred to by our readers, and in reply would refer to our issues of August and September, 1899.

Mercerizing Yarn.

Editor Textile World:

Will you kindly give me information regarding the processes of mercerizing cotton yarn?

M. E.

We have given in this magazine for the last twelve or eighteen months a number of articles referring to processes of mercerizing cotton yarn, but we would especially refer our correspondent to our issue of February, 1899, page 49.

Comber Setting.

Editor Textile World:

Can you inform me how to set a Dobson & Barlow comber for using Sea Island cotton, to take out 16 per cent. waste; the weight of lap per yard; and number of nips comber should be run; also how to find draft?

Comber.

The timing for Sea Island cotton to take out about 16 per cent. waste, is as follows:

Clutch wheel in gear at 3/4 = 3 teeth of index wheel. Feed at 5 = 20 teeth of index wheel. Top comb down at 5 1/2 = 22 teeth of index wheel. Detaching roller forward at 6 = 24 teeth of index wheel. Detach at 6 1/2 = 26 teeth of index wheel. Nip at 9 = 36 teeth of index wheel.

Distance between flutes and detaching of feed rolls, long Sea Island cottons, 2 1/16 inches.

Distance between flutes of detaching roller and front edge of cushion plate, 1 7/16 inches.

Set top combs to 21s wire gauge to cylinder segments; set top combs to an angle of 28 degrees or to 14 angle gauge.

Set feed rollers for long Sea Island 2 1/16 inch gauge between flutes of feed and detaching rollers.

To increase the percentage of waste, increase the angle of the comb, or let the nippers close a little later or feed a little later or set a little closer.

Mill Instruments Wanted.

Editor Textile World:

Will you be so kind as to inform me where I can purchase the following articles referred to on pages 183 and 184, E. A. Posselt's work relating to weaving: Graduated Cloth Weight Templet; Cloth and Yarn Calculating Rule; Scale Beam for Ascertaining the Kinds of Yarns?

R. H.

The instruments referred to are the invention of Arnold Schaer, superintend-

ent of the Warren Manufacturing Company, Warren, R. I., and we would suggest our correspondent writing to him; also, it might be well to write to Draper & Company, Hopedale, Mass.

Striper Attachment.

Editor Textile World:

We notice on page 77 of your November issue an account of a striper attachment of a knitting machine, about which we should like to obtain information.

M. L. B.

This is a recent invention covered by letters patent No. 634,510, which can be obtained by addressing the Hon. Commissioner of Patents, Washington, D. C.

Micrographs.

Editor Textile World:

Do you know where I can get micrographs made for me?

C. W.

Write to Prof. A. C. Scott, care of Rhode Island Agricultural College, Kingston, R. I.

Book on Sizing.

Editor Textile World:

Can you advise me whether there is a book covering the requirements of sizing in the manufacture of linoleum, oil cloth and carpets?

L. R.

We know of no book that treats on this particular branch of sizing, but would recommend to our correspondent the recent work of Hugh Monie, Jr., entitled, "Sizing Ingredients, Size Mixing and Sizing."

Number of Mule Spindles.

Editor Textile World:

Will you kindly inform us what is the approximate number of mule spindles being operated today in the United States, and greatly oblige,

Trans.

We estimate the total number of mule spindles in operation in the United States today at about six millions.

Split Laps.

Editor Textile World:

I see "J. L." asks how to stop "split laps." We were greatly troubled here for a long time in the same way. We applied W. T. Hurley's patent device for preventing split laps, and have had no trouble since. It is very simple and easily applied.

A. W. E. Capel, Treas. Smitherman Cotton Mills, Troy, N. C.

New Publications.

Quarterly Journal of Economics. Boston: George H. Ellis. The November issue, constituting No. 1 of Vol. XIV of this quarterly has just come out, as the authorized publication of Harvard University, under the editorship of Profs. F. W. Taussig, W. J. Ashley, C. F. Dunbar and Edward Cummings. The contents of this number consist of the following articles: The Commercial Legislation of England and the American Colonies; Productive Co-operation in France; University Settlements—Their Point and Drift; The Gas Supply of Boston.

Immedial Blue C. This is the title of a color card issued by Wm. J. Matheson & Co., New York. The dyeings of the samples shown were done in an ordinary padding machine. The methods of working the color are described and shown diagrammatically.

Tompkins Bros.' Catalogue. We have received from Tompkins Bros. of Troy, N. Y., an attractive catalogue which they have recently issued descriptive of their well-known knitting machinery. The subject is presented in an interesting way, and contains much general information of value. The cuts are new and illustrate the different parts of machines very clearly. There is a new cut shown of their cone winder. The catalogue will prove of interest to all those interested in this type of machinery.

Columbia Black F F Extra. The Berlin Aniline Works, 72 Front Street, New York, have issued a sample color card, showing the effect of their Columbia Black F F Extra on cotton linings.

Brilliant Milling Green B is the title of a color card issued by Wm. J. Matheson & Company, New York, showing the effect of a color by this name, on wool.

Dyeing Shoddy. Wm. J. Matheson & Company, New York, have issued an exceedingly valuable pattern card of shoddy goods colored by a process and dyes, about which information can be obtained by writing to this house, which we would advise manufacturers of this kind of goods to do.

Home Study in Textile Manufacturing. The American Correspondence School of Textiles, New Bedford, Mass., has issued its catalogue for 1899-1900, which will be mailed free on application to C. P. Brooks, director. Several new features have been introduced in this year's catalogue of the school, new courses of instruction have been added, and facilities offered for students either to obtain instruction on a few processes or on a few machines, or to take a full course of manufacturing or designing. Specimen pages from instruction papers are given and a number of interesting views of ancient and foreign manufacturing processes are given, which add value to the catalogue. Information is given as to the methods of the school, the fees payable, subjects of instruction, and other interesting information.

Industrial News.

—The new car barn at Port Chester, Conn., for the Port Chester Street Railway Company will be furnished by the Berlin Iron Bridge Company, of East Berlin, Conn. The building will be one of the largest of its kind in the country.

—Work on the shops of the Garvin Machine Co. in Berlin is now being pushed, and it is said that the roof will be on inside of ninety days. F. Engalls of Berlin is now in the United States ordering quantities of machinery for the new works. The Buffalo Forge Co., Buffalo, N. Y., has received an order for the hot blast heating and ventilating plant, which will include fans, engines, heaters, etc. Rudolph Kirschbaum, who is financially interested in the German enterprise, sailed for Europe Oct. 7, by the Kaiser Wilhelm der Grosse.

—The Allington & Curtis Mfg. Co. removed their Eastern office on November 1st to 81 Wareham St., Boston. They have such a large business in this section of the country that they maintain a branch establishment, where local work is promptly attended to. Their line covers dust collectors, furnace feeders, exhaust fans, blow piping, etc.

—Joseph Nasmith, the well known editor of "Textile Recorder," Manchester, England, has been spending a few weeks in the United States, in behalf of some private interests with which he is connected.

—The Fulton Bag & Cotton Mills, Atlanta, Ga., have placed a repeat order for pickers, cards and drawing frames with the Howard & Bullough American Machine Co., Pawtucket, R. I.

—The entire and exclusive right and license in and to the inventions and discoveries of Thomas & Prevost, for the processes of mercerizing under tension, of yarns and threads of every description, is now owned and controlled by the American Mercerizing Company, 260-266 West Broadway, New York City. We refer to the advertisement of this company appearing elsewhere in this issue.

—The American Thread Co., Westerly, R. I., are now having erected the machinery for their extension. The picking, cards, drawing and speeders are being supplied by the Howard & Bullough American Machine Co., Pawtucket, R. I.

Elevators.

The Eastern Machinery Co.

Gentlemen: Our elevator, built by your predecessors, has lifted to cupola stage all the pig iron and stock we have used in the past dozen years. Although it has been operated almost wholly by men hired for their muscle rather than for their brains, we have not lost the use of it a single day on account of breakage, and the cost of repairs has been a very small matter.

The state factory inspectors have carefully examined the machine from time to time, tried the safety catches on car and given the whole rig their unqualified approval.

The present excellent condition of the machine is due to two facts:

First, it was thoroughly well built, and

Second, it has been equally well cared for.

Yours respectfully,
The McLagon Foundry Co.
New Haven, Conn.

—Buckingham Bros. is a new concern which has recently started in business in Chicago at the corner of Franklin and Van Buren Sts. They make a specialty of the manufacture of ladies' rainy day skirts. They are enterprising young men, and will undoubtedly make a success of this specialty.

—The Oneida Mills, Graham, N. C., have placed another repeat order for spinning frames with the Howard & Bullough American Machine Co., Pawtucket, R. I.

—The Cling-Surface Mfg. Co. of Buffalo, N. Y., report that they are receiving rapidly increasing orders from textile mills, besides those from every other branch of business. An interesting example of the way Cling-Surface sells itself is in Salem, N. C., where F. & H. Fries, manufacturers of cotton and woolen, ordered a can in May, '99, then a second and third can; soon the Fries Mfg. & Power Co., then the South Side Mfg. Co., the Forsythe Mfg. Co., then two other concerns, amounting to 90 per cent. of the town's industries ordered the material, Cling-Surface itself having done the talking.

—The Lowell Textile School has received a Prior cotton gin, which they are running and turning out some nice samples of cotton.

—The Lawton Spinning Co., Woonsocket, are now receiving large shipments of machinery. All of the picking, cards, drawing and speeders were placed with the Howard & Bullough American Machine Co., Pawtucket, R. I.

—The New Bedford Textile School has started an extensive lecture course for the public, and among the speakers already promised are H. E. Walmsley, agent of the Wamsutta Mills; Robert Burgess, superintendent of the Grinnell Mills, and J. C. Monaghan, United States Consul at Saxony, Ger.

—The Clyde Steamship Company have placed the contract with The Berlin Iron Bridge Company, of East Berlin, Conn., for a new pier shed and dock at Providence, R. I. The building will be 40 feet wide and 600 feet long.

H. G. McKerrow & Co.

H. G. McKerrow & Company, 31 State St., Boston, Mass., agents for Tweedales & Smalley, Castleton, England, have received entire orders for cards and drawing frames from the Ashcroft Cotton Mills, Florence, Ala., and for drawing and speed frames from Seth A. Borden, treasurer of the Parker Mills, Warren, R. I. An order for speeders has been received from the Mechanics Mills, Fall River, Mass.

H. G. McKerrow & Company, Boston, Mass., have received the entire order for mules for fine spinning, made by Richard Threlfall, from the Lawton Spinning Company, Providence, R. I.

H. G. McKerrow & Company have received orders for Tweedales & Smalley's machinery as follows: For drawing

frames from the O. A. Robbins Company, Charlotte, N. C.; spinning and speed frames from the Montmorency Cotton Mills Company, Montmorency Falls, Quebec; drawing frames from the Vivian Cotton Mills, Cherryville, N. C.; intermediate frames from the Dominion Cotton Mills, for their Halifax mills.

H. G. McKerrow & Company have received repeat orders for Tweedales & Smalley's machines as follows: Speed frames from the Peabody Manufacturing Company, Newburyport, Mass. (third repeat); speed frames from the Edgefield Manufacturing Company, Edgefield, S. C.; various machines from the New York Mills, Oneida County, N. Y. (second and third repeat); speeders from the Parker Mills No. 2; drawing frames from the Winthrop Mills, Taunton, Mass.; different machines, including some from Richard Threlfall, from the Aragon Mills, Aragon, Ga.; roving frames from the Fairfield Cotton Mills, Winnsboro, S. C.; various machines from the Walcott & Campbell Spinning Company.

H. G. McKerrow & Company are beginning to deliver the machinery made by Tweedales & Smalley, placed on order with them by the Harmony Mills, Cohoes, N. Y. This has been a quick delivery. This company has also about completed the installation of the machinery of Tweedales & Smalley's make, which was ordered by the Aragon Mills, Aragon, Ga.

Tweedales & Smalley's machinery is now being put in by this company at the Parker Mills, Warren, R. I., and the work has been finished in the erection of this make of machinery at the Hargraves Mills No. 1, Fall River.

Smethurst's Roving Gear.

S. C. Meader, agent of the Gonic Mfg. Co., recently wrote Mr. Smethurst as follows:

George Smethurst, Esq.
Maynard, Mass.
Dear Sir: We have used the roving gear ever since we received it. It works well, and we think it is a good thing. This gear has been running ever since the middle of July.

—Hon. E. S. Stevens, Quinebaug, Conn., has made a general advance in wages to take place at once. This is the first mill in that section to make the advance.

—N. A. Lombard & Co., of Worcester, are getting their share of the new orders for woolen cards being placed. They are busily engaged now in building four sets for the Northrop Woolen Co. This concern is one of the oldest builders of woolen carding machinery in the country, and recognized as building a first class card. Their machinery wears well and there are many sets of their cards running today which have done good service for a long time and still have years of usefulness ahead of them. They have remodeled their machinery from time to time, as the progress of the art demanded, and when they saw an opportunity to improve.

—S. W. Goddard, of Worcester, well known to woolen manufacturers, has recently started in the manufacture of a new line of yarn dressing machinery. He is located temporarily at the Lombard Shops, 64 School St., Worcester. Mr. Goddard also expects to manufacture worsted cards in the near future.

—The Sharpless Dyewood Extract Co., 22 N. Front St., Philadelphia, had a fine display of samples of logwood and fustic from Hayti, Nicaragua, Mexico, Africa, etc., at the Export Exposition.

—South Carolina, Cheraw. R. W. Mitcham of this place is interested in the organization of a cotton factory here, with capacity of 10,000 spindles and 500 looms. It is proposed to operate the mill day and night on spinning, and day time on weaving only.

—South Carolina, Lando. The Manetta Mills confirm our report of their increase in capital stock to $100,000. They are now operating 7000 spindles on 30s to 40s warps and skein single and 2-ply.

—South Carolina, Walhalla. The Walhalla Cotton Mills will soon be under the charge of Messrs. Edwin R. Lucas, of Asheville, N. C., and W. E. Lucas, of Laurens, S. C. An issue of preferred stock to the value of $50,000 and common stock of $28,000 will be made, and enlargements and improvements added to the plant. The plant is now fitted with 200 looms and 3400 spindles.

—Tennessee, Mayville. A charter has been granted to a company at this place to erect a $25,000 mill.

—Tennessee, Nashville. W. H. Rowe, of W. H. Rowe & Son, New York City and Troy, has been in the South looking over property with a view to establishing a plant for manufacturing knit underwear. He has been conferring with the Chamber of Commerce, who are interested in such a project, about the probabilities of this place.

—Texas, Beaumont. J. Howard Bromley, of Philadelphia, Pa., is corresponding with W. B. Crawford, of this place, relative to the organization of a company here with a capital stock of $100,000 to operate a mill in Beaumont. Mr. Bromley has an equipment of 100 looms, winding frames, dyeing and finishing machinery, which he proposed removing to the contemplated plant. Ladies' dress goods, trouserings, etc., would be manufactured, giving employment to about 125 hands.

—Texas, Garrison. C. S. Baines is circulating a subscription paper for a cotton mill, and about $15,000 has been pledged. They want to raise $50,000.

—Virginia, Richmond. The Virginia Carolina Chemical Co., a company formed by all the leading fertilizing factories of the South, is to erect a mill for the manufacture of bags at this place. The company now uses 10,000,000 bags, and expect to make a large proportion of this number after the new plant is ready.

—Virginia, Suffolk. It is reported that further enlargements and improvements will be made to the new plant of the Suffolk Knitting Mills Co. after the plant has been started up.

MILL NEWS.

Cotton.

New Mills.

—*Alabama, Prattville. It is now understood that J. T. Floyd and Joseph Proctor of Prattville and J. N. Trainer of Chester, Pa., have decided to rebuild the Allenville Mill near here. We mentioned this project last September, at which time these parties had not decided about rebuilding.

—*Arkansas, Dardanelle. A new cotton mill is to be established here by J. D. Kennedy & Co., formerly of Cincinnati, O. It will have 2500 spindles and will make cotton yarns; steam power, employing about 75 hands. It is expected that production will begin February 15, 1900. These parties are now operating 1,000 spindles in Cincinnati.

—Florida, Cottondale. J. R. Shoemaker proposes erecting a cotton factory for the manufacture of cotton rope. He will be in the market for all kinds of machinery excepting power.

—*Georgia, Aragon. The installation of machinery by the Aragon Mills is about completed.

—Georgia, Athens. We have ascertained that W. D. Griffiths is the party actively interested in organizing a cotton mill company here to have $200,000 capital stock. It is proposed to start with a small equipment of about 2000 spindles and 200 looms; steam power.

—Georgia, Atlanta. Mr. Simon Bear, of 906 English-American Building, is interested in the project for the erection of a 5000 to 50,000 spindle cotton factory at this place. It is reported that Mr. Bear is now considering offerings of the necessary machinery, preference given to second hand equipment.

—Georgia, Camilla. T. R. Bennett, of this place, is interested in the organization of a company to erect a cotton mill.

—*Georgia, Canton. T. W. Hogan informs us that $75,000 has been subscribed toward a new cotton mill company, and he expects to have the full capital of $100,000 subscribed very soon. It will be known as the Canton Cotton Mills. T. B. Latimer, J. M. Price and A. S. Clay are interested with him.

—*Georgia, Cartersville. A cotton mill project is again under consideration, and a lot of land has been granted for the purpose, with the understanding that the mill must be completed within 12 months. They are talking of a 3500 spindle plant, and A. M. Foute of the Land Co. seems to think that there is a very good chance that the mill will be built.

—*Georgia, Cedartown. Work will be started at once on the erection of the new cotton mill at this place. Although no name has yet been decided upon for the plant, the officers will be: M. O. Berry (Columbus, Ga.), president; A. W. Birbeck (Cedartown, Ga.), secretary and treasurer, and William Parker (Cedartown), manager.

—*Georgia, Columbus. Ground has been broken for the foundation of the new cotton mill of the Columbus Mfg. Co., of which B. F. Gordon is president and Charles H. Utley, of Boston, treasurer. The contract for this plant was awarded to the Flint Bldg. & Construction Co., of Palmer, Mass. Lockwood, Greene & Co. are the engineers.

—*Georgia, Dalton. The following directors have been elected for the new cotton mill company recently mentioned as projected here with $100,000 capital: G. W. Hamilton, P. B. Trammell, G. W. Oglesby, J. B. Headrick, H. J. Smith, J. K. Farrar and W. C. Martin.

—Georgia, Dublin. The Dublin Cotton Mills is the name of a new corporation with $50,000 capital stock, of which William Pritchett is president; M. W. B. Thomas, manager. The mill will soon be built.

—*Georgia, Greensboro. The new Mary-Leila cotton mill building at this place is completed, but it will probably be three months before the machinery is all placed and work started in manufacturing. C. E. Monfort is secretary and treasurer.

—*Georgia, Griffin. The Spaulding Cotton Mills, which were incorporated last spring, propose to start work on their plant. Capital stock, $200,000. J. J. Mangham is president. The main building will be 100 by 275, two stories, and the first installation of machinery will be 7500 spindles and 200 looms, although the buildings will allow double this equipment.

—*Georgia, Lagrange. Cicero Revis, in the interest of the Mutual Aid Society, has purchased the old Towns place, of 150 acres, about six miles from the city, and is going to try to erect a cotton factory to be operated by colored help.

—Georgia, Lawrenceville. Cuyler Smith, of Atlanta, has organized a company with capital stock of $70,000 to erect a cotton mill at this place. Over $22,000 has already been subscribed and it is said that the majority of the stock will be taken by local capitalists. L. M. Brand, W. G. McNelly, W. E. Simmons and Ewing & Powell are interested in the project. They expect to have the new plant in operation by November 1900.

—Georgia, Macon. Lee M. Happ, 417 Cherry St., Macon, is considering the establishment of a cotton wadding factory, and would like information from builders of this kind of machinery.

—*Georgia, Thomaston. We have been informed by T. M. Matthews, secretary and treasurer (pro tem) of the new cotton mill at this place, that the plant will probably begin operations April 1st, 1900, under the name of the Thomaston Cotton

Mills, with a capital of $70,000. Yard wide sheetings and 7/8 drills will be manufactured. The plant will contain 5000 spindles and 150 looms, be operated by steam power, and give employment to about 100 hands. A temporary board of directors has been elected until the granting of charter.

—*Georgia, Toccoa. T. A. Capps sends us information as follows concerning his enterprise which we reported last week. The plant is expected to be in operation next September, operating 5000 spindles, for the manufacture of yarns, and later the product will be cloth. Steam power is to be employed.

—Indiana, Madison. R. Johnson, of this place, is altering and refitting an old building for manufacturing purposes. The product, though not fully decided upon, will probably be yarns and twines. The plant is to have 3000 new spindles, and will employ about 100 operatives. It is to be known as the R. Johnson Yarn & Cordage Mills. There will be a dyehouse in connection with the plant, and steam power will be used. H. D. Martin is superintendent.

—*Louisiana, Monroe. The $50,000 required for the Ouachita Cotton Mills has been subscribed with $2000 over, and the project will be pushed forward vigorously.

—*Louisiana, Shreveport. The Hargrove Cotton Mill, which we have reported at various times during the past year, is having specifications prepared by D. A. Thomkins Co. The plant will have 10,000 spindles to start with, and 2500 looms. Product will be four and five yard sheetings. John W. Taber, president.

—Massachusetts, Adams. The machinery is now being installed in the new plant of the Berkshire Mill. Full data concerning this plant was reported in one of our previous issues.

—*Massachusetts, Fall River. Benjamin F. Smith, Pawtucket, has been awarded contract to erect new weave shed, costing about $300,000, for the Bourne Mills, in the town of Tiverton. Ground will be broken at once for building, which will be 362 by 312, one and one-half stories, and will contain 2600 looms. The plant will be so constructed that another story and a half can be added at any time. If the latter addition is made, they will transfer the spinning from the present mill to the new plant.

—*Massachusetts, Taunton. The new yarn mill of the Winthrop Cotton Goods Co. is being framed in and some cotton for the plant has been received. Work is being pushed vigorously, and it is expected to get into production in the spring.

—*Mississippi, Tupelo. At a meeting held last evening in the interest of the new cotton factory proposed at this place, it was found that $80,000 has been subscribed toward a plant to cost $100,000. Preparations will now begin for the erection of the mill.

—*Mississippi, Canton. We have been informed by B. F. Passmore, M. D., that although $65,000 was subscribed and a charter granted for the new cotton mill at this place, it is probable that the project will be abandoned.

—Mississippi, Crystal Springs. A meeting of the citizens of this place was held November 20, and it was decided to take immediate steps toward the establishment of a cotton factory. T. L. Trawick was elected president at the meeting, and is interested in receiving all possible information on the subject in regard to plans, costs, machinery, etc.

—Mississippi, Greenville. The Valley Cotton Mfg. Co. has been organized and chartered here with a capital stock of $50,000. William W. Stone is interested in the company. Work will be started soon on the buildings.

—*Mississippi, McComb City. The McComb City Cotton Mills, which were recently organized with $110,000 capital stock, have elected J. J. White, president. A building, 70 by 280, will be built and equipped with 1000 spindles at the start, but it is expected to soon increase to 6000.

—*Mississippi, Moorhead. We have been informed by C. H. Pond that the Moorhead Cotton Mills are to be organized with a capital of $150,000, as soon as charter is granted. They will manufacture osnaburg and flat duck. Work will be commenced immediately on a plant to contain 5000 spindles and 160 looms. Orders for the machinery, which will be entirely new and of the latest and best in the market, will be placed within the next two or three weeks. It is expected to have the plant in operation by August, 1900.

—*New Jersey, Deckertown. Wehnert & Whitaker's new plant will be operated under the name of the Deckertown Mfg. Co. They expect to get into production about the 1st of December, with 20 looms, making turkish towels, wash and sponge cloths. There will be a dyehouse.

—New Jersey, May's Landing. The New Jersey Cotton Mill Co. has been chartered with a capital stock of $200,000, of which $125,000 has already been subscribed. The officers are: President, H. C. James; vice president, John S. Risley; secretary, L. W. Cramer; treasurer, L. E. Jefferies; general manager, James W. Shea. Land has been secured and it is reported that work on a new building will be started at once.

—*New York, Little Falls. The Chamber of Commerce has accepted the offer of Robt. McKinnon to the effect that if they would present him with a suitable site, he would erect a new yarn plant. The building will be 100 by 245 feet, six stories, and cost about $400,000, giving employment to about 800 hands in addition to that number now at his present mill here. A lot has been selected which is said to be one of the best for manufacturing purposes.

—North Carolina, Fayetteville. The Holt-Tolar and Hart Mill is nearing completion and will soon be ready for the installation of the machinery.

—*North Carolina, Hickory. Regarding the proposed new cotton mill, E. L. Shuford informs us that all he can say at present is that he has bought a splendid water power, with 150 acres of land, two miles from Hickory Depot, which, when developed, will afford power for 10,000 spindles. He will commence work on this

plant at once, but will not organize or give out orders for machinery before January 1st.

—*North Carolina, Raleigh. Plans are now being prepared for the Neuse River Mills, by A. Osborne, of the Sexton & Robbins Co., who will supply a large part of the machinery. The mill will start with 510 looms, but expect to double its capacity shortly after.

—North Carolina, Troy. A company is to be formed here, with a capital of $50,000, for the purpose of manufacturing yarns, employing 75 hands, and operating 2500 spindles. The interested parties are: J. G. Tomlinson, Troy, N. C.; M. E. Shomberger, Pekin, N. C.; D. D. Bruton, Troy, N. C.; and A. W. E. Copre. A name has not yet been decided upon for the company, but information can be obtained by addressing A. W. E. Copre, Troy, N. C.

—*Pennsylvania, Wilkesbarre. It is expected that money will soon be raised for the erection of a large plant to manufacture cotton goods, in which Clarence Whitman is interested. Should the project succeed, the mill will be constructed to contain 30,000 spindles and 800 looms, giving employment to about 400 hands. The Board of Trade is now making efforts to raise the desired capital.

—*Rhode Island, Shannock. The Shannock Narrow Fabric Co., which has been organized with a capital of $10,000, Albert Turner, president, and John Crowther, treasurer, will begin operations Dec. 1st, with 12 looms, on various kinds of narrow fabrics.

—*South Carolina, Anderson. A charter has been obtained for the American Yarn & Knitting Mills, with a capital stock of $50,000, to erect a yarn and knitting plant. This is the project in which D. P. McBrayer was reported interested in last September.

—*South Carolina, Duncans. A. B. Groce confirms our report of his having secured an option on the Van Patton Shoals, in the Enoree River, with 2000 H. P. It is his idea to organize a company which will build a cotton mill. No definite steps have yet been taken, but the matter will be pushed as speedily as possible and mill engineer's services obtained and complete power and machinery equipment required.

—South Carolina, Gaffney. A water power on Broad River near Gaffney has been purchased by H. L. Spears of Gaffney for himself and others, and it is expected that a company will be organized to develop this for cotton manufacturing and other purposes.

—*South Carolina, Greenville. Some progress is being made toward a new cotton mill here. A charter has been applied for under the name of the Quintin Mills, with a capital of $300,000. J. I. Westervelt has been North, and it is understood has placed much of the stock there. At present, talk is of a 10,000 spindle mill with 300 looms.

—South Carolina, Westminster. It is reported that $92,000 has already been subscribed for the new $100,000 cotton mill here, to start with about 7000 spindles.

—*Tennessee, Eastlake. Work is progressing rapidly on the building of the Richmond Spinning Mill at this place.

—Texas, Henderson. W. J. Graham and Samuel Patton have been elected chairman and secretary respectively, of a committee formed for the purpose of erecting a cotton mill at Henderson. The proposition of a $100,000 plant, with shares at $25 each was agreed upon. They have already begun to solicit stock and it is probable that the undertaking will prove successful.

—*Texas, Hillsboro. We have been informed by A. L. Lowrey that capital stock is now being rapidly subscribed for the new mill at this place, and there is very little doubt of the mill being built. As the plant contemplated will be entirely new, they will have to buy everything necessary for such a project.

—*Texas, Rusk. A cotton mill company is again being considered here, and it is said that T. C. Nubie will be manager of the plant. A small capital will probably be put in at the start. It will be remembered that in May, 1899, it was reported that a mill was to be removed from Snowville, Va., to this place, but this project did not materialize.

—*Texas, Waxahachie. The cotton mill project which has been mentioned several times is again revived. E. A. DuBose of the committee advises us that he has now $60,000 subscribed, and that they expect to organize some time this month. They wish to build a mill with not less than 5000 spindles, to make coarse brown cottons.

Enlargements and Improvements.

—Alabama, Huntsville. The Huntsville Cotton Mills Co. will expend $200,000 in enlarging and improving their plant. Work has been started on an addition to their thread mill, which will cost $50,000 to $100,000. It will be a two-story structure, 150 feet long. New machinery is also to be put in the main building.

—Alabama, Piedmont. The Coosa Mfg. Co. will increase its equipment, and is now building houses for new operatives.

—Connecticut, Willimantic. Contract for the new finishing mill of the American Thread Co. has been awarded and work will be pushed forward as rapidly as possible.

—*Georgia, Beverly. W. A. Swift, the treasurer and general manager of the Pearl Cotton Mills, informs us that their addition will contain 3500 new spindles, giving them a total of 7500. There will be no dye house. The mill makes warps and skeins.

—Georgia, Roswell. The Roswell Mfg. Co. have placed orders for about $50,000 worth of new machinery.

—Massachusetts, Fall River. An addition, 28x51, one story, to be used for carding purposes, is being made to the Conanicut Mill.

—Massachusetts, Easthampton. C. W. Smith has the contract for the addition to be built by the Glendale Mill at this place. Work will be commenced at once.

—Massachusetts, New Bedford. The Lambeth Rope Company is fitting the new addition to its plant with additional machinery and making other improvements so as to give much larger facilities for doing work.

—Massachusetts, New Bedford. The Rotch Mill of the New England Cotton Yarn Co. has ordered 80 more combers. This mill now has 100 combers.

—Massachusetts, Shirley. The Samson Cordage Co. will erect a new building 40 by 40 feet, to be used as a power house on the site of the old Fredonian Mills, which were destroyed about three years ago. The power house will be connected with the engine house, which was not burned at time of fire. A large dynamo will be installed and electricity made with which the company will run the old Phoenix Mill.

—*Massachusetts, Smithville. White Bros., of Winchendon, who purchased the cotton mill at this place, are to make extensive additions and improvements to the plant. A weave shop, 132x30 feet, to be supplied with 128-30 inch Whitin looms will be added to the front of the main mill, while a dye house, 50x40 will be constructed in the rear. The firm, who operate other mills will manufacture a good grade of denims at the Smithville plant.

—Massachusetts, Warren. It is reported that the Thorndike Co. is to use the present unoccupied number 4 mill to make yarn, and will fit it up with necessary machinery.

—New Hampshire, Hooksett. The Hooksett Mills have been reorganized and the active management of direction of affairs has passed into the hands of Manchester mill men. The new organization is as follows: Arthur E. Mason of Boston, president; Harry D. Bourne, Manchester, treasurer. Directors, Stephen N. Bourne of Manchester, Franklin L. Joy of Boston, French Campbell of Manchester and the above named officers. The office of the treasurer, who will be manager of the plant, is 75 Granite St., Manchester. The machinery equipment will be thoroughly overhauled and a large new dyehouse will be erected, to which the plant of the Meshanticut Dye Works, Cranston, R. I., will be removed.

—*New Jersey, Gloucester City. The Argo Mills Company have increased their capital stock from $500,000 to $600,000, for the purpose of making enlargements and improvements to the plant.

—North Carolina, Roanoke Rapids. The Roanoke Mills will put in 100 new looms as soon as possible. This will give them a total of 550.

—*North Carolina, Rockingham. Robert L. Steele, president of Steele's Mills, manufacturers of print cloths, informs us that this company will increase its capital stock 50 per cent., and will put in new machinery. They have ample space for this new equipment without enlarging their buildings. Regarding the proposed bleachery and dyeing plant, Mr. Steele informs us that he has taken no definite steps in this matter, but is merely considering the project.

—Rhode Island, Westerly. The Lorraine Mills are having plans prepared for an addition to be made to their plant. It is probable that the contract for the erection of same will be let in about six weeks.

—*Rhode Island, Woonsocket. The addition which we reported in October as being built to the Eagle Mills is now being completed, and the new looms are being installed.

—South Carolina, Anderson. At a recent meeting of the directors of the Anderson Cotton Mills, it was decided to increase their plant by the addition of 6000 spindles and 200 looms, which will be ordered at once.

—South Carolina, Fork Shoals. The Fork Shoals Cotton Mill, which succeeded Nesbitt & Sons, is remodeling the plant, and when completed will have a total equipment of 2800 spindles. W. P. Nesbitt of Piedmont is president.

—*South Carolina, Greenville. The No. 2 mill of the American Spinning Co., which has been reported several times, seems now assured. President J. H. Morgan has been in the North, and the project is approved by the Eastern stockholders, who will take all the stock not subscribed locally. The plan includes a new brick weaving mill, which will weave the yarn made in the No. 1 mill. Most of the machinery has been arranged for.

—Wisconsin, Janesville. The Rock River Cotton Co. advises us that foundation for their addition was started November 8th, and they expect to begin production of cotton twine about the 1st of May. Some new machinery will be put in, but it has not been decided definitely how much. Steam power employed.

Mills Starting Up.

—Massachusetts, Millbury. Edward F. Rice & Co., who recently purchased the Millbury Cotton Mills, are starting up the plant as fast as possible.

—*North Carolina, Chapel Hill. The new mill at this place, Thomas F. Lloyd, sole proprietor, started operations last week. The plant, which has a capacity of 5000 spindles, is well equipped.

— —North Carolina, Concord. The No. 5 mill of the Odell Mfg. Co. has been completed and started up. 100 looms have been installed and 200 more will be placed as soon as possible.

—Rhode Island, Greenville. After a two years' shut down, the Winsor Cotton Mill at this place will be put in operation. Manton Vaughan, who will be superintendent, is interested also in the corporation which purchased the plant.

Mills Shutting Down.

—Massachusetts, Cherry Valley. The mill operated by E. Collier has been shut down for a few days owing to the changes made in the grade of goods. Hereafter the stock will come to the mill all prepared for the cards and sent away to be finished.

—Massachusetts, North Dighton. The North Dighton plant of the New England Cotton Yarn Co. has now been shut down, as previously reported, and some of the machinery is being removed to other plants and some sold.

Woolen.

New Mills.

—*Indiana, New Albany. We learn that the New Albany Woolen & Cotton Fibre Co. will not manufacture cloth, but make shoddies of every description, and do custom carding, picking, etc.

—*Maine, Old Town. The Ounegan Woolen Company, which we reported in August would have its mill ready to start by the 15th of September, is operating eight of the 25 looms which have been installed, and it is expected that the mill will be in full operation soon. This firm manufacture light weight goods.

—*Maine, Waterville. The new mill at this place in which Thomas Sampson is interested, is to be operated under the name of the Riverview Worsted Mill. Thomas Sampson is president and treasurer and G. W. Overend, agent. Medium priced fancy worsteds will be made and operations will begin with 50 looms.

—Massachusetts, Millbury. C. T. Aldrich has decided to rebuild his mill which was burned October 30th. The boiler, picker and stock houses were not injured. The new mill will be 80 feet square, four stories high, and will contain five sets of machinery for satinets.

—*Massachusetts, North Chelmsford. The Success Worsted Co., of which Walter A. Leigh is manager, is starting up its plant. About 30 looms have been installed and finishing machinery is being put in.

—Massachusetts, Shirley. The Gould Mfg. Co., Oakdale, Mass., successors to S. Goldstein, have purchased the Binney Paper Mill site and privilege at this place and have broken ground for a new shoddy and flock mill, which they expect to complete by the 1st of February. They will have steam and water power and will probably put in a dye house. Equipment will be two sets of cards, six shoddy pickers, a garnett and two flock cutters. This mill will be in addition to the one which they run at Oakdale and which they will continue to operate there.

—Michigan, Alma. C. F. Brown, George Sharrar and V. S. Hollenbeck have been chosen president, vice-president and secretary and treasurer respectively of the new Alma Woolen Mills Co. Work will be pushed as rapidly as possible on the new building, plans for which have been made and accepted.

—New Jersey, Passaic. The Board of Trade has made a statement to the effect that the Gera (Germany) Woolen Company, capital stock of $2,000,000, had purchased land and would commence at once to erect a large plant here.

—*North Carolina, Greensboro. The main building of the carpet mill at this place is nearly finished and machinery will soon be removed to it from New Jersey.

—*Pennsylvania, Doylestown. The new Doylestown Worsted Co., organized with a capital of $25,000, are having plans prepared for its new building by Archt. A. O. Martin of Doylestown. This building will be 50 by 100, brick, two stories.

—Pennsylvania, Philadelphia. Robert H. Shaen has leased space in the building at 2630 Mascher St. and will install 14 broad looms for manufacturing dress goods.

—Rhode Island, Providence. The Roubaix Worsted Mills is the name of a new corporation with $25,000 capital, of which Thomas H. Bull is president, Walter H. Hersey, treasurer. The company will manufacture worsted yarns by the French system; will buy tops. The plant will be located at 43 Sabin St., which is where the Crown Worsted Mills were located.

—*Rhode Island, Providence. We learn that the Milson Worsted Co. is the name of the new concern in the Paine & Sackett mill building. They will have 10 frames and will manufacture plain worsted and novelty yarns. Charles F. Murphy & Co., of Boston, are the selling agents.

—*Vermont, Lyndonville. The Lyndonville Woolen Co. has been formed at this place by E. F. Wood and E. Bigelow, to manufacture woolen yarn. This will be a one-set mill, with necessary spindles, and they expect to begin operations about March 1900. They are in the market for all the machinery necessary for equipping the plant. Electricity will be the motive power.

—West Virginia, Terra Alta. It is understood that J. W. Rigg & Sons will rebuild their mill which was burned some time ago. In September we reported that a company would be formed for this purpose.

Enlargements and Improvements.

—*Connecticut, Moosup. The Moosup Worsted Mill, controlled by the American Woolen Co., is to be enlarged, doubling its present size. The mill is now running nights owing to the brisk business.

—Illinois, Ipava. C. F. Foote, now operating a two-set blanket mill, is about to put on an addition.

—*Maine, Bridgton. M. D. Harris, superintendent of the Pondicherry Co., informs us that his company is building a 50-foot addition to their main mill, also a brick boiler and engine house, 48 by 56, with a 100 foot brick chimney. They will put in a battery of Dillon boilers, which, with their present boiler, will give them 300 H. P. They will put in a Corliss engine of 200 H. P. They are short of water at present and are running about two-third time.

—Maine, Dexter. The Penobscot Woolen Mill will add a set of cards to its equipment.

—Maine, Fairfield. It is reported that the American Woolen Company will shut down the mill at this place and transfer the machinery to the mill at No. Vassalboro. Later, changes and improvements will be made to the Fairfield plant, though what they will be has not yet been decided.

—Maine, Gardiner. The woolen mill here will add a new set of cards, making four in all, and 15 more looms, making a total of 35.

—Maine, Lisbon Centre. An addition, 50x50 will be made to the weave shed of the Farnsworth Mill at this place. The addition which is to be used for spinning and storage purposes, will be ready for occupancy about the first of January.

—Massachusetts, Blackstone. About 100 new looms will be put in the Saranac Mill.

—*Massachusetts, Clinton. We understand that the necessary machinery for

spinning worsted yarn for their own use has been ordered by the Clinton Worsted Co., but owing to the pressure of orders from manufacturers, it will be some time before it can be installed.

—Massachusetts, Franklin. The Waite Mill of the American Felt Co. is being extended and a new water tower erected.

—Massachusetts, Huntingdon. The Massasoit Woolen Mills are making improvements and also installing new machinery. A notice has been posted by the company to the effect that on the 15th of November, an advance will be made in wages.

—Massachusetts, Jefferson. Work is now being finished on a new dye house at the Eagle Lake Mill.

—*Massachusetts, Lawrence. The large addition to the woolen and worsted mill operated by George E. Kunhardt is nearly completed. About 200 new Crompton & Knowles looms are being installed.

—*Massachusetts, Millbury. The Bowden Felting Works will add new machinery in order to double their capacity. An enlargement will be made to the plant next season.

—Massachusetts, Saxonville. We learn further concerning the addition to the Saxonville Mills, that a brick building, 135 by 80, two stories high, is being erected, the first story of which will be used for dyeing wool slubbing and yarn in order to supply the trade, which is calling for mixtures and fast colors in yarns for men's suitings. They will not manufacture suitings, but continue on worsted yarns and blankets. The second floor of the building will be the blanket department.

—New Hampshire, Ashland. Two large annexes are being made to the woolen mill operated by R. H. Hart. The production of goods will be increased and additional help called for.

—New Jersey, Bridgeton. Extensive alterations and improvements are being made to the plant of the Bridgeton Woolen Co.

—New York, Newfane. The Lockport Felt Mills are to be enlarged by an addition of 26 by 30, and a third story will be put on the whole plant, increasing capacity about 50 per cent.

—New York, New York. Increasing business has necessitated making improvements to the plant of Robert Stuntz, proprietor of the Persian Rug Factory at Brook Ave and 167th St. He also contemplates adding a dye house.

—Pennsylvania, Bridgeport. Weaving and finishing machinery in James Lee & Sons' plant has been removed and worsted and woolen yarn spinning mahinery installed in its place.

—*Rhode Island, Centreville. The new weave shed, which the Kent Woolen Co. expected to have in operation by Oct. 20th, is now nearing completion.

—Rhode Island, Pascoag. The Stone Worsted Mills are adding a number of new looms.

—Rhode Island, Woonsocket. A new dye house is being built by the Woonsocket Electric Machine & Power Co. for Henault, Campbell & Yongman, who recently leased the No. 4 mill near the Court St. bridge and are equipping it with machinery.

Mills Starting Up.

—Connecticut, East Killingly. C. D. & C. S. Chase are starting up their No. 2 mill at this place, which has been idle for the past two years. They will make ladies' suitings at this mill, which has 22 looms.

—*Connecticut, New London. The management of the New London Steam Woolen Co. includes Henry Levins of Philadelphia, president; Robert McLean of New York, treasurer; A. W. Sholes of New London, agent and superintendent.

—Connecticut, Stafford Springs. The Mineral Spring Mill has been sold to the Middle River Woolen Co. This company has leased the property to Frederick Faulkner of Lowell, who will move to Stafford and start the plant up just as soon as possible, making dress goods. This mill has not run regularly since the death of the late Mr. Converse, its former owner.

—Connecticut, Stamford. The reorganized Rippowam Woolen Mills have started up and are running full force. We believe the new name of the concern is the Mianus Mfg. Co., recently incorporated with a capital stock of $25,000.

—*Connecticut, Thompsonville. Work has been started in all the departments of the Hartford Carpet Co.'s mill, but it will be some time before all the looms will be in operation. The men in the dyehouse, who have been out on a strike for about six weeks, have also returned to their places.

—*Illinois, Charleston. The Charleston Woolen Mfg. Co. made a test of the boilers in the plant recently, and it is expected that the mill will soon be started up.

—*Maine, Limerick. The Limerick Mfg. Co., which is operating the former Holland Mill, has started up to manufacture dress goods. A new brick boiler and picker house will be built and water power plant thoroughly overhauled and equipped with new machinery throughout, operating five sets of cards and 20 looms.

—Maine, Springvale. The Springvale Woolen Mills are starting up their plant, which was recently organized.

—Massachusetts, Auburn. The Auburn Worsted Mill plant, which has been idle for several years, is to be started up at once by Wilkinson Crossley, formerly boss dyer of the Assabet Mfg. Co., and his brothers, Robert and Henry.

—Massachusetts, Collinsville. The Collins Mill of the American Woolen Co., which has been thoroughly overhauled and equipped with new machinery, is starting up.

—*Massachusetts, Middleboro. The Farwell Worsted Co. of Central Falls, R. I., purchased the Star Woolen Mill, and all other buildings belonging to the property, at the auction of the same on the 15th inst. for $18,000. The mill will be at once fitted up for the manufacture of worsted cloth. The plant has been shut down for about two years.

—*Massachusetts, Pittsfield. The Pontoosuc Woolen Co., who have started the

dressing department of the Taconic Mill, in connection with their plant, will add several more looms. It is possible that within a short time the entire plant will be in operation.

—Massachusetts, West Rutland. After several months' idleness, work has been resumed in the Lakeville Woolen Mill.

—New Hampshire, South Wolfboro. The Wolfboro Woolen Mills, operated by I. W. Springfield, which have been shut down since last summer, have now been started up. This is a four-set plant, making blankets.

—New York, New York. The Manhattan Woolen Mills, 11th Ave. and 130th St., which have been idle for some years, are being repaired, and will be operated in the manufacture of worsted yarns. M. Summersgill will have the superintendency of the plant.

—New York, Otto. As soon as the machinery can be put in good order, the Pierce Woolen Mill, which has been closed down for seven years, will be put in operation. About 40 hands will be employed.

—*North Carolina, Hope Mills. The Bluff Mills, recntly bought by the Hope Mills, are being equipped with new looms and will soon be in operation.

—Pennsylnvania, Lyndell. J. B. Eastwood & Co.'s mill at this place, which has been idle for several years, has started up.

—Rhode Island, Ashaway. The two-set mill at Bethel, which has been in the hands of a savings bank for a number of years, was bought last summer by the Ashaway Woolen Co. We understand that they are now making preparations to put the plant in operation some time in December. A new dam is being built and a new flume and wheel put in. Machinery will be generally overhauled and will be operated on men's worsted suitings.

—*Rhode Island, Washington. The old Kilton Mill, now leased and operated by the Coventry Woolen Company, has been started, and about eleven of its looms are in operation.

Knit.

New Mills.

—*Alabama, Sylacauga. It is now reported that the McDonald Cotton Mills, upon which work has been started, expect to put in knitting machinery to use the yarn from their 5000 spindles. This plant will probably be started up early next year.

—*Georgia, Albany. Arrangements have been completed for the erection of a knitting mill here, by Messrs. W. Harris and L. Zucker. We recently reported that these negotiations were in progress.

—Indiana, Sellersburg. J. H. Waters Co. contemplate operating a knitting plant here with about twenty-five machines.

—*Massachusetts, Lowell. The Hooper Knitting Co. has been incorporated with a capital of $100,000. George L. Hooper is president and Horace P. Beale, treasurer. This is the concern we mentioned before as establishing a new hosiery plant on Roger St., near the Taylor St. bridge. Mr. Hooper was formerly manager of the Shaw Stocking Co.

—*New York, Perry. The brick work for the new mill to be built by the Perry Knitting Co. has been let to Manlon & O'Brien, of Geneseo. Work on the building will be pushed as rapidly as possible.

—North Carolina, Elizabeth City. The Elizabeth City Knitting Mills have been incorporated with a capital stock of $20,000. W. C. Glover, G. M. Scott, T. P. Nash, J. L. Sawyer and others are the incorporators.

—*North Carolina, Kernersville. The Davis-Crews Knitting Mill, foundations for which have been started, will make men's half hose, employing 25 hands. At the start, twelve knitting machines will be operated, with three loopers and three ribbers; steam power. The interested parties are: L. F. Davis, president; E. J. Davis, treasurer; T. A. Jones, superintendent. Some of the equipment has not yet been bought.

—*Ohio, Barnesville. The new knitting mill now under construction at this place by the Barnesville Hosiery Co., of which G. E. Bradfield is president and W. H. Anderson, secretary and treasurer, will contain all the latest improved machinery. It is expected to have the plant in operation January 1st, starting with 100 knitting machines. Steam and electric power will be used. They will erect a separate dyehouse, 20 by 30 feet.

—*Pennsylvania, Annville. The machinery is now being installed in the knitting mill of Andrew Kreider & Sons. It is expected to begin operations in the plant early next month, furnishing employment to about 50 hands.

—*Pennsylvania, Downington. The Downington Knitting Co., capital $10,000, has been organized with John H. Johnson president, Maxwell Clower, secretary and treasurer, and Geo. E. Knowles (of Philadelphia) superintendent. The plant will be put in operation as soon as possible, giving employment to about 75 hands, among which will be women and girls.

—*Pennsylvania, Gettysburg. The new knitting mill which is being built by the Development Co. for Oscar Rielly is well under way, and will be ready for occupancy within a short time.

—Pennsylvania, Honesdale. Brown & Blakeney will establish a new knitting mill here, employing about 15 hands; product to be women's woolen underwear.

—*Pennsylvania, Oreland. C. & G. Sasman inform us that they do not expect to rebuild their mill at this place for some time. They are now located at 1927-1933 Hope St., and 1928 No. Front St., Philadelphia.

—Pennsylvania, Reading. A charter has been applied for by local capitalists for the Reading Glove & Mitten Mfg. Co. to make silk gloves, mittens and underwear. A large plant, giving employment to several hundred hands, will be erected. The incorporators are: John Barbey, Ferdinand Goetz, A. J. Brumbach, Ferdinand Winter and others.

—*Pennsylvania, Troy. The old Loveland Woolen Mill will be operated as a knitting mill by a company of which James Shelton will be president, S. A. Shelton, treasurer. 25 knitting machines will be put in and product will be ladies' fine fast black hose. Production will probably start November 20th, employing 30 hands. The plant also has three looms and an entire equipment for a one set mill.

—Pennsylvania, Waynesboro. A meeting has been held by the Board of Trade relative to establishing a knitting mill here. Mr. Sheeley, an experienced man in that line, was present and explained the workings of such an enterprise. A committee was appointed to secure a competent man to act as superintendent, and if successful they will at once raise a stock subscription of $10,000 and begin work.

—Pennsylvania, Wilkesbarre. The Wilkesbarre Knitting Mills Co. is the name of a new corporation with a capital of $100,000. The incorporators are: J. T. Moran, W. Menzier, W. L. Post, S. J. Tonkin, and J. Roberts, Jr., all of Wilkesbarre.

—Rhode Island, Woonsocket. S. T. Stiles, formerly of the Leicester Knitting Co., will establish a plant within the next few weeks in the building formerly used as a machine shop by the Model Rubber Co. on South Main St.

—*Tennessee, Nashville. We learn further about the new Nashville Hosiery Mills that Jesse N. Thomas is president; W. Morrow, treasurer, and A. W. Stone will be superintendent. They will make children's and ladies' hose at first and later may put in machinery for underwear. Electric power will be employed, and there will be a dye house. It is expected that the mill will give employment to 300 hands, and it is hoped production will begin about the middle of February. Work on building is well under way. Mr. Stone is East buying the equipment.

—*Virginia, Lynchburg. The new mill of the Virginia Textile Co., of which D. G. McLaren of West Sand Lake, N. Y., is manager, is nearly completed. The full equipment and particulars of this project were given by us in August. C. H. Acknanowr of West Sand Lake will have charge of the installation of machinery, and it is expected that the plant will be in production early in the year.

—Wisconsin, Portage. J. C. Smith, formerly of Chicago, has rented quarters in the Arthur Block, which he will fit up and operate as a knitting factory, employing about 15 hands.

Enlargements and Improvements.

—Connecticut, Danielson. The Uncas Knitting Co. are running over time and are putting in considerable new machinery.

—Connecticut, New Haven. The capital stock of the Glendora Knitting Co. has been increased from $5000 to $12,000.

—*Iowa, Des Moines. We learn further from the Des Moines Hosiery Mills that their capital will be increased to $100,000. They are putting in 29 new knitting machines and adding a dye house. This gives them a total of 182 machines. They sell direct.

—New York, Cohoes. The cotton spinning machinery which the John H. Murphy Co. have been intending to install for some time, is now being set up in their plant.

—New York, Utica. The Oneita Knitting Mill is to make another enlargement to their plant by the addition of a story to the No. 1 mill, which is 50 by 75, giving needed room in the finishing department.

—North Carolina, Scotland Neck. The Scotland Neck Knitting Mills are putting in new machinery to replace some of the old. The dyeing department is to be entirely refitted.

—Pennsylvania, Boyerstown. George Unger has bought a lot, 32 by 60, on which he will build a two-story structure by which he will enlarge his knitting plant.

—*Wisconsin, Appleton. The Appleton Knitting Company inform us that the addition which they are to build will be 120 feet by 60 feet, instead of 20 by 60, as reported by us last week, and that the amount and kind of machinery they are to put in has not yet been decided upon.

Mills Starting Up.

—*Massachusetts, Methuen. It is reported that the Knitted Fabrics Company at this place is now operating the plant of the Swain Mfg. Co., which suspended operations a few months ago.

—New York, Cohoes. The Orkney Knitting Mill will start up at once. This plant has 30 knitting machines and produces balbriggan underwear. David S. Johnston is proprietor.

—New York, Oswego. The Swits-Conde Co., whose plant has been shut down for several months, is now gradually starting, and they will probably have the entire plant running very soon.

—Pennsylvania, Chester. The Chester Stocking Mfg. Co., operated by Rodgers & Roberts, on West Second St., expect to start operations next week. About 15 hands will be employed.

—Virginia, Berkeley. The Berkeley Knitting Mills have started up their new plant, which we have reported several times previously.

Mills Shutting Down.

Silk.

New Mills.

—*Massachusetts, Milford. Louis P. Magid has now incorporated his company as the Magid-Hope Silk Mfg. Co., with a capital of $500,000, of which $158,000 is said to be already subscribed. The officers are: President, Louis P. Magid; treasurer, Warren M. Hill; directors, George Otis Draper, Winthrop Thayer, William E. Stowe and Arthur F. Gray and the president and treasurer.

—New York, Congers. A new silk mill is to be built here at an estimated cost of about $60,000.

—New York, New York. The Equitable Silk Mills at Ridgewood, L. I., and

office at 454 Cherry St., New York, which were burned in October, are to rebuild. The plant formerly contained 81 looms and made ribbons and other narrow silk fabrics.

—*Pennsylvania, Dunmore. It is expected that the plant of the Jenkins-Powell Company, located on Throop St., will soon be ready for occupancy.

—*Pennsylvania, Hazelton. The plush factory, which we recently reported would be established at this place by the Plush and Silk Weaving Company, is now assured, and the necessary buildings will be erected. This company includes members and officers of the Board of Trade, of which A. T. McAllister is secretary.

—*Pennsylvania, Jermyn. It is reported that the contract has been awarded for the new silk mill to be erected at this place, and that as soon as necessary bonds, etc. are furnished by the contractor, work will begin at once on the building. C. F. Baker, James A. T. Boundy and William Walker are authorized to receive all subscriptions.

—*Pennsylvania, Lebanon. We now learn that the silk manufacturers who contemplate locating here are William T. Ward and Thomas M. Miller of New Jersey. They have been in the town and appear to be favorably impressed.

—*Pennsylvania, Pittston. Work is progressing rapidly on the new silk mill here. In about a week the construction of the building will be well under way.

Enlargements and Improvements.

—Connecticut, Bridgeport. The Bridgeport Coach Lace Co. advises us that their addition will be a brick building 68 by 147. Foundation has been started, and it is expected that they will begin production in April, giving employment to 65 more hands. They will put in four lace looms, making a total of 20. Gas power is used.

—Connecticut, Mystic. It is reported that the Rossie Velvet Co., who now lease their plant, may buy the property and extend it considerably.

—Connecticut, Norwich. The Owaneco Silk Co. is building a brick addition to its plant, which is well under way.

—*New Jersey, Phillipsburg. The large addition to the Standard Silk Company's mill is almost completed.

—New Jersey, Summit. The Summit Mfg. Co., which has been closed down until after the holidays, is completing the new addition to the mill. They expect to start operations again some time in January with a greater force of help.

—Pennsylvania, Carbondale. An addition 24 by 80 feet will be built by Klots Bros. to their silk mill at this place. Owing to the increasing of the firm's business it has become necessary to make the enlargement.

—*Pennsylvania, Freeland. The Freeland Silk Mills, which recently commenced erecting an addition, have now started work on the foundation for the new 250 h. p. engines.

—Pennsylvania, Lancaster. Contract has been awarded to build an addition to the silk mill of the Swiss firm of Stehli & Co., of which E. H. Barlow of New York is the agent.

—Pennsylvania, Reynoldsville. A large addition will be built to the Reynoldsville Silk Mill. They are now installing 100 additional looms to the plant, making a total of 300.

Mills Starting Up.

—*Pennsylvania, York. The York Silk Mill has commenced operations with seventy looms. Thirty more will be set up as soon as they are received and put in running order.

Mills Shutting Down.

—New Jersey, Phillipsburg. In default of the payment of the interest due on the bonds, the trustees for the bondholders of the Burgee Silk Mill, formerly operated by Ilig & Coene, have had the plant closed.

Miscellaneous.

New Mills

—*New York, Utica. The new Utica Dyeing Co. expects to start operations early in December. The firm is composed of F. W. Brown and R. B. Billings of the Rome Soap Mfg. Co., and Richard Moore, head chemist and dyer at the New York Mills. They expect to do all classes of dyeing, including raw stock, skeins and piece goods, and bleaching yarns and mercerizing. They have leased the building corner of Third Ave. and Broad St.; 100x70, and are overhauling it for their purposes and putting in new machinery, which will include two raw stock dyeing machines, six skein and mercerizing machines, extractors, drying machinery, and they will start with a capacity of 10,000 lbs. daily. Most of the machinery has been arranged for. It is understood that they expect to do work for the mills in that vicinity and have already assurred business.

—North Dakota, Wheatland. The Northwestern Land, Twine and Fibre Co. are putting up a flax fibre mill at this place.

—*Pennsylvania, Chester. The Chester Dyeing Co., which succeeds W. H. Carr & Brother, will very probably put in a bleaching plant and may put in a plant to dye warps and skein yarns. They are now equipped to dye raw cotton. James S. Austin, president; N. P. Sloan, 241 Chestnut St., Philadelphia, treasurer, and John Greenwood, superintendent.

—Rhode Island, Lymansville. Work will be started next week in James D. Minto's new dye house at this place. They are now moving the old machinery to the new house and when done the plant will be run on full time.

—*Rhode Island, Providence. Work on the new F. C. Sayles Bleachery at Phillipsdale is progressing rapidly. A one-story brick building is now well up and a large force of workmen is now preparing filter beds and reservoirs. This plant is located at the end of Roger Williams Ave., which is at the terminus of the Broadway & Phillipsdale electric car route. The bleachery building is of white

brick, and the plant will be a model one throughout. The equipment will provide for finishing, as well as bleaching.

Enlargements and Improvements.

—Connecticut, Bridgeport. The Salts' Textile Manufacturing Co. are having plans drawn for an addition of 54 by 100, two stories. Joseph W. Northrop is the architect.

—Connecticut, Jewett City. An addition is being made to the Aspinook Bleachery.

—Massachusetts, East Brookfield. E. Gibron, who operates the Esther Mills, owned by W. G. Keith, is having a new building, 80 by 34, 1 story, erected to be used for a dye-house.

—*Massachusetts, Franklin. An addition is being built to the linen mill of the Worcester Textile Company, at Unionville.

—Massachusetts, Lawrence. L. Sjostrom & Sons are making extensive alterations and additions to their plant. A new two-story brick main building is being built, and a great deal of new machinery is to be installed.

—Massachusetts, Millbury. The Union Linen Co., which is now operating in the old Wheeler oCtton Mill, is reported to be rushed with orders, and new looms have been ordered.

Fires.

—Massachusetts, Lawrence. Fire, which originated in the drying room of Fred Hartley's wool scouring mill at this place, caused a great deal of damage to the machinery and stock. Loss on wool and machinery is estimated at about $15,000, and on the building $1000; covered by insurance. The building is a two-story brick structure and is owned by George Davis.

—Michigan, Vassar. The second and third stories of the Vassar Woolen Mills, operated by Balbian Bros., with a large amount of new machinery and stock, were completely destroyed by fire recently. The loss is estimated at about $20,000; partly covered by insurance.

—Pennsylvania, Mordansville. The woolen mills at this place, operated by C. L. Sands & Co., were recently damaged by fire.

—Pennsylvania, Williamstown. J. W. Durbin & Son sustained a loss to their mill to the value of about $3000, with a partial insurance. The plant will be repaired and put in operation as soon as possible.

—Virginia, Berkeley. The Chesapeake Knitting Mills were damaged by fire in the carding room to the extent of $4,000, easing temporary shutting down.

—*Virginia, Lambert's Point. The new plant of the Norfolk Silk Co., which was nearing completion, was partially destroyed by fire on the 18th inst. The loss, which is estimated to be about $25,000, is covered by insurance. Work will begin at once on rebuilding the mill.

—Washington, Spokane. The one set mill which is being built by the Spokane Textile Mfg. Co. was burned recently. The machinery was in the building and plant nearly ready to commence operation. The company has not yet decided whether they will rebuild. The Spokane Chamber of Commerce is entitled to portion of credit in the erection of this mill, and is looking for other parties to establish a woolen mill.

Failures and Suspensions.

—New Jersey, Deckertown. The firm of Mellor & Co., towel manufacturers, have gone into bankruptcy. John W. Harding, commissioner in bankruptcy, is looking after the affairs of the creditors, for whom he has named William Wilson as trustee. The plant is valued at about $60,000, but is encumbered to nearly $50,000, $30,000 being for a mortgage.

—*Pennsylvania, Troy. The Northern Woolen Mfg. Co. is in financial difficulties, and the mills are advertised for sale by the sheriff. The company has a large number of orders on hand, and it is hoped that the mills will be able to continue operations.

Facts and Gossip.

—Alabama, Anniston. The factory of the Anniston Bag Co. has been leased by Messrs. J. H. Pratt & A. E. Yeates of Atlanta, who will equip the same for manufacturing burlap bags in addition to the manufacture of cotton bags for which the plant is already fitted.

—*Alabama, Uniontown. The Ellawhite Cotton Mill has been incorporated here with a capital stock of $100,000. R. F. Hall, J. C. Moss, A. C. Davidson, W. H. Taylor, R. E. Loveless and S. T. Whitfield are the incorporators.

—Connecticut, Danielson. The Sayles Mill, owned by Wm. H. Sayles and formerly operated by James Legg, under the name of the Yukon Woolen Company, has been purchased by Henry J. Brown and Arthur C. Davis, of Worcester. Mr. Brown, who will be the active man in the concern, will at once begin preliminary work at the mill and endeavor to have the plant in operation on cassimeres for men's wear before the first of the year. The plant, which now contains 5 sets of cards and 26 looms, with dyeing and finishing machinery, will give employment to about 80 hands.

—Connecticut, Middletown. The Portland Silk Co. have recently added twelve new looms to the plant. The rapidly increasing business of this concern necessitates more room and it is reported that they will soon build a large addition.

—Georgia, Louisville. It is rumored that quite a large sum has already been raised toward capital stock of a cotton mill projected for this place. E. W. Thompson, of Charlotte, N. C., is interested. A company has been organized with W. W. Abbott as president.

—Georgia, Swainsboro. Benj. Humphrey is interested in organizing a company to erect a spinning mill at this place.

—Kansas, Wachita. It is said that this place is to have a woolen mill. The old mill in El Dorado has been purchased by Mr. Pierce, and the machinery has been moved to this city, where it will be installed in a mill and operated.

—Maine, Skowhegan. The Marston Worsted Mill has begun running nights, and it is said to have orders enough on hand to run a double crew until spring. This is the new mill of which Edwin Gledhill is manager.

—Maryland, Ellicott City. It is reported that Gray's Cotton Mill, owned by John M. Bone, which has been idle for a number of years, has been sold. The property consists of 60 acres of land, upon which are 39 houses and the mill. The new proprietors will utilize the plant for a cotton mill, it is expected.

—Massachusetts, Conway. The creditors of John Fothergill, the bankrupt woolen manufacturer, of this place, held an adjourned meeting, Nov. 11th, before Referee Henry J. Field. Claims were proved and W. G. Avery, the trustee, presented an account which was not final.

—Massachusetts, Easthampton. The West Boylston Mfg. Co. are installing combers, ribbon lap machines, beaters, scutchers and mules.

—Massachusetts, Holyoke. The Chadwick Plush Co. is now, we understand, being operated in conjunction with the Sanford Plush Mill. It will be remembered in August we reported that the majority of the capital stock changed hands, but the management remained the same.

—Massachusetts, Lowell. The Waukenhose Co. has reduced capital stock from $300,000 to $150,000.

—Massachusetts, Lowell. The consolidation of large carpet manufacturing concerns; viz., the Lowell Mfg. Co., Bigelow Carpet Co., of Clinton, seems probable. The consolidation is advised because of the large saving in expense that could be effected, and as the concerns are largely competitive, there are other advantages to be gained. It seems probable that the deal will be made.

—Massachusetts, New Bedford. It is rumored that Edward Kilburn and Frank H. Gifford are interested in promoting the erection of a yarn plant here, with capacity of 50,000 spindles, to be independent of the combine.

—Massachusetts, North Bellingham. The North Bellingham Mill, formerly owned by the Ray Woolen Co. and latterly by the American Woolen Co., has been purchased by a new company in which Taft, Murdock & Co. are interested and also Mr. Haywood of Franklin, together with Mr. Ray and Mr. Rathburn, and Charles E. McDougall, who for the past few years has been superintendent of the plant. Mr. McDougall will continue as manager of the new concern, which is a 10 set mill, equipped with 130 looms. This mill was taken over with the other Ray woolen property, but its product was not such as could be advantageously employed by the combination. The name of the company will be the Charles River Woolen Co. It will make union cassimeres, overcoatings, etc.

—Massachusetts, Rutland. It is reported that the Moulton Mill, which was destroyed by fire, will be rebuilt.

—Michigan, Brooklyn. The State Dyeing & Knitting Co. has been incorporated with capital of $7500. Thomas J. Davis, Henry L. Quick, John Bently and Alfred Davidson, are the directors.

—New Hampshire, Rochester. An effort is being made by the citizens of this place and surrounded district looking towards the purchase and starting up of the Norway Plains Mills. James Corson is one of the leading spirits, and we learn that nearly $50,000 has already been pledged and an effort will be made to raise $100,000. The plan is either to interest some practical men in the project, or else to purchase the mills and lease them to some firm who will operate them.

—New Jersey, Passaic. The Pitkin-Holdsworth Worsted Co. has been incorporated here with a capital of $200,000 to operate the worsted mill of Pitkin, Holdsworth & Co., Ltd., Passaic, N. J. F. Eugene Pitkin (Nyack, N. Y.), John W. Pitkin (Englewood, N. J.), Joseph Holdsworth and Oscar Dressler (Passaic, N. J.), are the incorporators.

—New Jersey, Paterson. Emil Geering has purchased the plant of the Weidman Silk Dyeing Co. from Robert J. McDermott, who was appointed receiver to succeed John R. Beam. Mr. Geering will use the plant as an annex to his dyeing establishment.

—New Jersey, Paterson. The Sterling Silk Co. is to move its entire plant to Newton, N. J., where they are now operating a branch mill.

—New Jersey, Pompton Lakes. A certificate of incorporation has been granted to the Byrne Bros.' Co., to operate the Millbank Bleach Works at this place. It is a reorganization of the business, and George W. Abbott of Passaic has taken an interest in it.

—New York, Clinton. Propositions are now being made for the installing of machinery for the purpose of manufacturing yarns in the prisons at Sing Sing and Clinton. This is owing to the fact that there are so many inmates who are idle.

—New York, Gloversville. At a recent meeting of the stockholders of the Gloversville Knitting Company, it was unanimously voted not to enter the proposed glove trust.

—New York, Little Falls. The control of the Little Falls Knitting Mills Co. has passed from the hands of Charles Bailey & Sons to J. J. Gilbert and Elijah Reed, who have purchased the majority of the stock.

—North Carolina, Fayetteville. It is reported that the Ashley & Bailey Co., who are now operating a plant here with negro labor, have purchased more land in the suburbs, and will erect another mill here.

—Nova Scotia, Westville. This place has offered the Stanfield Knitting Co., of Truro, exemption from taxes for ten years, if they will locate their plant here.

PERSONAL RECORD.

Cotton.

—L. I. Allen has succeeded Joseph Stephens as overseer of weaving at the Indian Head Mill, Cordova, Ala. Mr. Allen occupied this position once before, when the mill was first started up.

—Alfred Barnes is now at the Eagle & Phenix Mill No. 2, Columbus, Ga., as overseer of carding, R. Wilson, Jr., having resigned.

—J. W. Byerly is now overseer of the cloth room at the Randolph Mfg. Co.'s mill, Franklinville, N. C.

—Robert Bradshaw, formerly at the Tecumseh Mills, Fall River, Mass., is now overseer of weaving at the Grinnell Mill, New Bedford, Mass.

—D. J. Balden, of McColl, S. C., has accepted a position as secondhand in the spinning room of the Southern Cotton Mills, Bessemer City, N. C.

—James Biggs of Hope Mills (N. C.) No. 1, has accepted the position of overseer of weaving at Mill No. 3, formerly the Bluff Mills.

—William A. Barr, formerly at Columbus, Ga., has accepted the position of overseer of carding at the Willingham Mill, Macon, Ga.

—G. G. Boone has resigned as overseer at the Dilling Cotton Mills, Kings Mountain, N. C., and James Thomas, of Columbia, S. C., has taken his place.

—Luther Brown has been promoted to the position of night overseer of spinning and carding at the Cannon Mills, Concord, N. C.

—E. R. Cash, superintendent of the Gaffney Mfg. Co., Gaffney, S. C., has resigned to accept the superintendency of the water and electric light works at the same place.

—Thomas Collier, employed for some time as loom fixer at the Beaver Mill, North Adams, Mass., has accepted a position as superintendent of the wadding mill of the Hall & Clark Mfg. Co., Valatie, N. Y.

—Andrew J. Crumley, overseer of frame spinning department in the Bernon Mill, Georgiaville, R. I., has resigned and is now in a similar position with the Quinebaug Co., Danielson, Conn.

—J. E. Crosby, formerly boss weaver at the Laurens Cotton Mills, Laurens, S. C., has accepted the position of superintendent of the Walhalla Cotton Mills, Walhalla, S. C. E. Bishop, secondhand, has succeeded him as boss weaver.

—D. E. C. Clough is the new overseer of spinning at the Victor Mill, Greer Depot, S. C. He was formerly at Fairmount, S. C.

—W. Davis is now overseer of frame spinning at the Forestdale Mfg. Co., Forestdale, R. I., taking G. E. Hays' place.

—Marcellus Gould, agent of the Falls Co., Norwich, Conn., has resigned and John F. Reardon, who is now managing a mill in Millville, N. J., will take charge of the plant on or before January 1st, 1900. Mr. Gould has been agent of the Falls Co. for the past four and a half years, and previously was for nine years superintendent of the Amoskeag Mfg. Co., Manchester, N. H., where Mr. Reardon got his first start under him. Mr. Gould is interested in the new mill being erected at Penacook, N. H., a suburb of Concord, of which he has been elected president and general manager.

—Charles H. Gordon has gone South to accept the position of superintendent of a cotton mill in Georgia.

—Assistant Superintendent Gallagher of the Peabody Mills, Newburyport, Mass., has resigned. As yet no one has been appointed in his place. Charles Twing, overseer of the card department, is acting in that position.

—Edward Gilligan, overseer of weaving at the Quidnick Co.'s No. 1 mill, Anthony, R. I., has resigned to accept a similar position with the Windham Mfg. Co., Willimantic, Conn.

—F. C. Greason, formerly at the Berkshire Cotton Mills, Adams, Mass., has accepted charge of a department in the Raleigh Cotton Mills, Raleigh, N. C., where his brother is superintendent.

—D. Guillette of New Bedford has accepted position in charge of combs at the Grant Yarn Co., Fitchburg, Mass.

—Col. Frank Harris has severed his connection with the Pycott Mfg. Co., Woonsocket, R. I., as general manager, and has also retired as treasurer of the Hamlet Mills. Robert Stewart is now in charge of the Hamlet Mills as superintendent.

—R. C. Herndon, formerly at the Massachusetts Mills, Lindale, Ga., is now filling the position of overseer of slashing at the Aragon Mills, Aragon, Ga.

—R. F. Jennings, formerly at the Gaffney Mills, Gaffney, S. C., has accepted the position of overseer of card grinding with the Granby Cotton Mills, Columbia, S. C.

—W. P. James is now overseer of spinning and twisting at the W. R. Kindley Cotton Mills at Mt. Pleasant, N. C.

—Charles A. Knox, for several years secondhand in the cloth department of the Pemberton Mills, Lawrence, Mass., until change of management, and lately with the Sultan Mills as a foreman, has gone to Three Rivers, Mass., where he has accepted an important position in the Palmer Mills.

—L. F. L. Herault, secondhand in the spinning department of the Ashton Mill, Ashton, R. I., has given up the place to accept the position of overseer of the Windham Mfg. Co., Willimantic, Conn. James Wright of the No. 1 mill at Lonsdale has assumed the duties of secondhand in the spinning department at the Ashton Mill.

—E. L. Lelwell, who recently left the Wadesboro Cotton Mills, Wadesboro, N.

C., where he was overseer of carding, for a position at the new mill at Norwood, N. C., has returned to Wadesboro to take his old stand.

—William H. Magee, superintendent of the Berkeley Mill, Berkeley, R. I., has relinquished his duties as superintendent for a few months, on account of ill health, and Charles H. Collins, paymaster at the mills, will act as superintendent during Mr. Magee's absence.

—Charles H. Merriam, Jr., who has been superintendent of the Globe Mill at Woonsocket, R. I., will, in addition to his present duties, occupy the position of superintendent of the Social and Nourse Mills, in place of eGorge W. Cumnock, who has been obliged to retire on account of ill health. Edward W. Houghton, for ten years an employee of the Social Mfg. Co., and until a short while ago overseer of carding at the Nourse Mill, has been appointed assistant superintendent of the Globe Mill, and will have practically the charge of the mill under the authority of Supt. Merriam.

—H. F. Moody, superintendent Indian Head Cotton Mills, Cordova, Ala., has resigned.

—W. F. McLendon, formerly overseer of spinning at the Morris Cotton Mill, Cateechee, S. C., is now overseer of carding and spinning at the Chewalla Cotton Mills, Eufaula, Ala.

—Edgar Moore, formerly secondhand in card room in the Holt-Williamson Mill at Fayetteville, N. C., now has charge of carding and spinning at night.

—H. D. Martin, formerly of Shirley, Mass., has made quite a reputation for himself in starting up new plants. His latest position in this line is at Madison, Ind., where he is starting and superintending the new mill being built by Mr. Richard Johnson. Mr. Martin is a mill man of practical experience and great energy, and will undoubtedly start the new project in the right way.

—Frederick E. Prosser, overseer of weaving at the Clinton Cotton Mill, Woonsocket, R. I., has resigned.

—R. V. Porter of Columbia is now in the employ of the Courtney Mill, Newry, S. C., as overseer of spinning and spooling.

—T. G. Pruett, formerly of Stonewall, Miss., has secured the position of overseer of spinning and spooling at the Tuscaloosa Mills, Tuscaloosa, Ala.

—Gilbert W. Pratt, superintendent of the Lonsdale Co., Lonsdale, R. I., sent in his resignation on September 30th, to take effect six months after that date. He resigns owing to ill health. After 17 years with the Mason Machine Works, Taunton, he came to Lonsdale and entered the employ of the Lonsdale Co. as master mechanic, commencing work on the completion of the Ashton Mill, which was then covered in, and under his direction such machinery as was not imported was constructed and placed in condition for operating. In 1871 the addition to No. 4 mill was begun under his supervision, and later the bleachery with its equipment of modern machinery. The Ann & Hope Mill is another work showing his skill as mechanic and master builder, and the big dam at Lonsdale, which has on the centre pier, cut deeply into the stone, "Pratt Dam, 1894." In 1874 he was appointed assistant superintendent, and on the retirement of Mr. Kilburn in March, 1878, was made superintendent, having full control of the mills and property of the company at Lonsdale and Ashton. Mr. Pratt ranks as one of the best mill men in America, and it is much regretted that it is necessary for him to retire.

—A. J. Rose, formerly at the Cannon Mill No. 2, Concord, N. C., has accepted the superintendency of the Bala Cotton Mill, Concord, N. C.

—J. Roche has succeeded F. Goulet as secondhand at the Lawrence Duck Co., Lawrence. Mr. Goulet has gone to North Adams.

—Enoch Rhodes, formerly overseer of weaving at Clinton, S. C., has been appointed night overseer of weaving at the Poe Cotton Mills, Greenville, S. C.

—M. Sheehan, formerly at the Linwood Mill, Whitinsville, Mass., has accepted a position as overseer at the Clinton Mill, Woonsocket, R. I.

—A. F. Sisson, for a number of years agent of the Hadley Mills, Holyoke, Mass., has tendered his resignation to the company He will probably go to Westerly, R. I., to take charge of the mills of the thread combine there. Charles H. Robbins, formerly of the Willimantic Linen Co., will succeed him.

—C. N. Steed, late overseer of weaving at the Highland Park Mfg. Co., Charlotte, N. C., has secured a similar position with the Cherokee Falls Mfg. Co., blacksburg, S. C.

—W. B. Stone has been promoted from weaver to secondhand at the Edna Mills, Reidsville, N. C.

—John Short is now at the Sutro Cotton Mills, Yorkville, S. C., filling the position of overseer of carding and spinning. He was formerly at Newton, N. C.

—George Simpson, formerly overseer of spinning in the Holt-Williamson Mill, Fayetteville, N. C., is now overseer of carding and spinning in the day time.

—F. B. Whittaker, overseer of spinning, has changed from the Beaumont Mills, Spartanburg, N. C., to the Chester Cotton Mills, Chester, S. C.

—John J. Walmsley, secondhand at the Pierce Mfg. Co., New Bedford, Mass., has severed his connection with that corporation. Mr. Walmsley has secured an overseer's position in Centreville, R. I. His successor at the Pierce Mill is Joseph Cheatham, formerly third hand at the mill.

—S. A. Wing, Nashua, N. H., has succeeded H. P. Benner as overseer of weaving at the Monohansett Mill, Putnam, Conn.

—J. O. White, who has been superintendent of the Modena Cotton Mill No. 1 at Gastonia, N. C., has been appointed superintendent of the new Modena Mill at Gastonia, and will hereafter superintend both plants.

—R. A. Whitley has returned to his old position as assistant overseer of weaving at the Indian Head Mill, Cordova, Ala.

—E. B. Wilbur, superintendent of the Newberry Cotton Mills, Newberry, S. C., has resigned to accept the superintendency of the Gaffney Mfg. Co., Gaffney, S. C., taking Mr. E. R. Cash's place.

—James F. Wormwood, who for many years has been secondhand of the spindle room of the Saco & Pettee Machine Shops, Saco, Me., has been promoted to overseer of that department. He succeeds the late George Meserve.

Woolen.

—M. Allen, of Wilton, Me., is now filling position of boss carder and spinner at the Old Town Woolen Mill, Old Town, Me.

—E. P. Barbour, for a number of years in the designing room of the Newport Woolen Mill, Newport, Me., has severed his connection with the mill to become assistant superintendent of a mill in Hanover, Conn., where his father is the superintendent.

—Ephraim Bedford succeeds the late Mr. Norris Blackburn as superintendent of the Victoria Mills, Thornton, R. I.

—Charles Bray, late of the Lowell Textile School, has accepted a position as designer with the Tremont Worsted Co., Methuen, Mass.

—Dennis Brophy of Blackstone, Mass., has taken charge of weaving at the Westerly Woolen Co., Westerly, R. I.

—John Booth is now employed as boss carder with the Franklin (Mass.) Yarn Co.

—Peter Casey, Killingly, Conn., has been engaged as overseer of carding with the Dayville Woolen Co., Killingly, succeeding James Hardy, who has accepted a situation in New York State.

—John Cockcroft, for the past 36 years superintendent for D. Goff & Sons, braid and plush manufacturers, Pawtucket, R. I., has resigned, and intends to go to California with his family for a much needed rest. Upon taking his departure he was presented with many handsome remembrances from the help and overseers.

—Joseph Donohue has resigned his position as secondhand in the carding department of the Manton Mill, Manton, R. I., and has gone to Franklin.

—Hiram Dawson, assistant superintendent of the New England Woolen Mills, Rockville, Conn., has resigned. E. G. Berr, formerly boss weaver at the mills, succeeds him.

—Charles Firth has removed from Sabattus, Me., to Lewiston, where he is boss dyer in the Cowan Woolen Mill.

—George J. Gordon, for the past two years connected with the Warren Woolen Co., Stafford Springs, Conn., has resigned to accept the position of superintendent of Gordon Bros.' mills in Hazardville, Conn.

—Alfred J. Greaves, formerly with the Milner Co., Moosup, Conn., is now at the Crown Worsted Mills, Providence, R. I., filling the position of superintendent.

—Edward K. Harrison, of Philadelphia, has accepted the position of overseer of drawing with the Washington Mills, Lawrence, Mass.

—Thomas Heines is now with William Wood & Co., Philadelphia, Pa., filling the position of overseer of carding.

—W. S. Hodgson, of Worcester, has begun his new duties as superintendent at the Cranston Worsted Mills, Bristol, R. I., taking the place of Mr. Wilson, who resigned to engage in business for himself.

—Dana Labonian has taken Henry Harrington's place at the Mayo Woolen Mill, Millbury, Mass., as overseer of weaving.

—Evan Lewis is W. H. Brennan's successor at the French River Textile Co., Mechanicsville, Conn., as foreman carder.

—Charles E. McCarthy, paymaster of the American Woolen Co., Collinsville, Mass., has resigned. Mr. McCarthy occupied a similar position in the Burlington Woolen Co.'s works previous to coming to Collinsville in 1886. The office employees presented him with a pipe and a tobacco pouch filled with bills. Mr. McCarthy has rented a store in Collinsville and will also take charge of the mails, as well as represent Mr. Collins in business matters.

—T. N. Parent, secondhand of the carding and spinning department for Hall Bros., Norwich, Conn., has severed his connection with that concern to accept a position as boss carder and spinner with William Gregory, Wickford, R. I.

—Edward A. Pero, West Eaton, N. Y., is now with the Thos. Kay Woolen Co., Salem, Ore., as boss finisher.

—C. Rauchenbach has returned to the Broad Brook Woolen Co., Broad Brook, Conn. He has lately been working in Rockville.

—William Roebuck, for the past ten years instructor in the weaving department of the Philadelphia Textile School, Philadelphia, Pa., has tendered his resignation, having accepted a position as designer and boss weaver in a western mill.

—George Reid, for the past six years overseer of the weave room of the Brickner Woolen Mills, Sheboygan Falls, Wis., has resigned and accepted a similar position in W. P. Hewitt & Co.'s woolen mill, Menasha, Wis. Jacob Zanker of Chicago has succeeded him.

—T. Sampson, agent, and George Overend, superintendent at the North Vassalboro Woolen Mill, North Vassalboro, Me., have resigned. Mr. Sampson is starting a mill at Waterville, Me., of which Mr. Overend will be superintendent.

—Otto Serno has resigned his position with the American Woolen Co., at their mill at Harrisville, R. I., and accepted a superintendent's position in a large mill in Maine.

—Albert Wells, formerly of Ashaway, R. I., has recently accepted a position as designer with Beebe, Webber & Co., Holyoke, Mass.

—John Wheeler is now overseer of carding with the George McFarland Co., West Conshohocken, Pa.

—P. H. Walsh, who has been employed in a number of woolen mills in New England as overseer of carding, has been engaged as superintendent of the Glen Woolen Mills at North Oxford, Mass.,

the eight-set woolen mills at this place formerly operated by John Chase & Sons and called their No. 2 mills. John Walsh has been engaged as overseer of carding.

—Patrick F. Whalen, of Webster, Mass., has secured the position of boss weaver at the French River Textile Co., Mechanicsville, Conn., taking Alexander Smith's place.

—John H. White, Tarkiln, R. I., has been engaged by A. Howarth & Son, Rochdale, Mass., as overseer of weaving.

—Arthur J. Giroux, for the past three years superintendent of the French looms in John N. Stearns & Co.'s silk mill, Williamsport, Pa., has been employed as general superintendent of Givernaud Bros.' silk mill at Allentown, Pa.

—Albert Proulx, of Putnam, Conn., has secured a position as secondhand with the Globe Silk Mills, New Haven, Conn.

Knit.

—George Bassett, of Herkimer, boss spinner of the night force at Robert MacKinnon's knitting mill, Little Falls, N. Y., has severed his connection with the same, and Eugene Seeley succeeds him.

—L. A. Bentz, formerly Philadelphia salesman for the E. Jenckes Mfg. Co., Pawtucket, R. I., has accepted the superintendency of the Iowa Knitting Mills, Des Moines, Iowa.

—Emil A. DeWitte, formerly dyer at the River Spinning Co., resigned to take position as manager and buyer at the Woonsocket Knitting Co., Woonsocket, R. I., where he is partially interested.

—Henry Garant, late of Laconia, N. H., has accepted a position with the Columbia Hosiery Mills of New York City, as overseer of knitting department.

—Thomas Hardy, of Portsmouth, Va., has taken charge of knitting for the Powhatan Mfg. Co., Norfolk, Va.

—Michael Organ has accepted the superintendency of the Troy Knitting Co., Troy, N. Y., succeeding David C. Phillips, who, upon retiring, was presented with an arm chair by the employees.

—Charles H. Porter has accepted the position of superintendent with the Fay Stocking Co., Elyria, O.

—William L. Terry, formerly of Cohoes, but for several years employed in Robert MacKinnon's knitting mill, Little Falls, N. Y., has resigned.

—Allen A. Wheat, for the past 19 years superintendent of the Agawam Mill No. 1, Agawam, Mass., has retired. The employees presented him with a watch, chain and charm.

—November 30, Thanksgiving Day, was the fortieth anniversary of Mr. and Mrs. Andrew Scotland, Maltaville, N. Y. There was a very pleasant reunion of the family and celebration of the event.

Deaths.

—Hugh H. Osgood, for many years president of the Norwich Bleaching, Dyeing & Print Co. (now the United States Finishing Co.), also of the Sterling Dye & Finishing Co., died at his home in Norwich recently. He was one of Norwich's most prominent and public-spirited citizens, and his loss is deeply felt in the community.

—Frederick E. Clarke died suddenly at his home, 30 East Haverhill St., Lawrence, Mass., at midnight November 7th. He was apparently in perfect health, and had attended a meeting of the Monday Night Club, a literary organization, on the same evening of his death. Apoplexy is believed to have been the cause. Mr. Clarke entered the Lawrence Machine Shops to learn the machinist trade when 17 years of age, and from there went to the Pacific Mfg. Co., first as assistant to the mechanical director during the construction of the mills, and afterwards was in charge of pay rolls and cost figures. In March, 1858, he was appointed paymaster of the Pemberton Co., and three years later was made agent, which position he held until he retired on January 1st, 1898, the past six or seven months being actively engaged in the zinc industry, and was president of the Boston Duenweg Zinc Co. Mr. Clarke always manifested a deep interest in the public welfare. He was president of the local board of trade, chairman of the park commission and president of the Good Government Association. He was also president of the Boston & Lowell Railroad and of the New England Cotton Manufacturers' Association.

—Nathan L. Birge, of the well-known firm of N. L. Birge & Sons, Bristol, Conn., died recently at his home from heart failure, at the advanced age of 76. He was a native of Bristol, and one of the original "49ers" that went to California. Upon his return, he started what developed into the large knit goods business now carried on by his sons. He was prominently identified with many of Bristol's business interests, and leaves a widow and three sons, one of whom is ex-Senator John Birge.

—Edward P. Taft, one of the best known cotton manufacturers in Southern New England, died at his home November 5th, in Pawtuxet. He had been in failing health for the past two or three years, and since the last of June, seriously ill. Mr. Taft was head of the Ponemah Mill at Taftville, Conn., since the mill was started, and spent his life in its development. In 1865 he purchased a mill privilege and 600 acres of land along the banks of the Shetucket River and obtained a charter with three other incorporators and organized the Orray Taft Mfg. Co., for the manufacture of fine fabrics, like lawns, cambrics, and other goods then largely imported. The name of the company was changed in 1871 to the Ponemah Mill, and the range of goods widely extended. Today the mill has a capacity of 118,000 spindles, and the main building is said to be the largest single building devoted to the manufacture of cotton goods now in the Eastern States. Mr. Taft was also for many years connected with the Wauregan Mills and identified with other cotton mill industries. He was a director of the Providence & Stonington Steamship Co., as well as of several insurance companies, and was identified with the New York steamboat travel from the early sixties. Mr. Taft was highly esteemed in the community at large, and there was a universal expression of sympathy at his death

—James Jackson, the head of the firm of James Jackson & Sons, with works at Paterson and Little Falls, N. J., died at his home last month, in his 74th year. Mr. Jackson was born in Canton, near Lancaster, Eng., and started in at an early age in one of the cotton factories of Lancashire, where he worked himself up to be superintendent at the age of 25 years. For a short time he occupied an important position in Oldham, and in 1868 came to this country. It was in the year 1873 that he branched out in the business of Jacquard building, for which he was especially noted, and added the dyeing and finishing of silks and velveteens. Many additions have been built to his plant and finally the plant at Little Falls rented, which establishments he has run most successfully, his sons assisting.

—John M. Niles died Nov. 22d at his residence on Arlington St., Newton, Mass. Mr. Niles was for 27 years connected with the Brainerd & Armstrong Silk Mfg. Co. of New London, Conn., first employed as traveling salesman and for the past 17 years has been manager of their Boston office. Mr. Niles was looked upon as one of the most valued members of the city government. He was a member of the finance committee, and always expressed a deep interest in the city's affairs.

—Louis Soleliac, superintendent and manager of the Adelaide Silk Mills, Allentown, Pa., died Nov. 18th, aged 50 years. His death resulted from apoplexy. His father, Auguste Soleliac, was a silk importer and manufacturer, and his son learned that business, and in 1873 started a silk mill in Paterson, which he continued until 1881, when he assumed charge of the Adelaide Mills. Under his management, the mill increased in capacity until it is now one of the largest silk mills in America, with 1000 broad silk looms and 225 ribbon looms, employing 1300 hands. His wife, three sons and one daughter survive him.

—Seth Humphreys died last month. He was born in Yorkshire, Eng., in 1821, and when eight years old came to this country with his parents. With Jonathan Smith and Scholes Holdsworth, Mr. Humphreys was engaged in the manufacture of blankets and yarn for several years in Fairview, until the mill was destroyed by fire, and he then removed to Philadelphia. Subsequently he came back to Fairview and resumed manufacturing, which he continued successfully up to the time of his death.

—Robert Woodbury died at his home recently in West Somerville, Mass., aged 58 years. He had been in poor health for some time. For many years he resided in Newport, N. H., and in that place was engaged in the woolen business, and was well known and highly respected. He leaves a widow.

—Edward Kay, a member of the firm of Beswick & Kay, proprietors of the Fairmount Spinning Mills, Philadelphia, Pa., died at his home, 2415 Fairmount Ave., recently, aged 67 years. Mr. Kay was born in Manchester, England, but came to America when quite young. He entered the wool business, and in 1871 formed a partnership with Samuel Beswick, under the firm name of Beswick & Kay, in which he continued until his death. Three children survive him.

—Harry D. Kemball's death, which occurred late in the afternoon of November 3d, was a great shock to his family and many friends. He fell dead in the corridor of Hotel Cadillac, New York. Heart disease was the cause. Mr. Kemball for the past year had been in charge of the New York branch of Arthur Merritt & Co., of Boston, chemicals and dyes, and had been very successful.

—Walter S. Davis died at his home in Contoocook, N. H., recently. He was born in Warner, July 29, 1834. For some years he dealt in lumber and hemlock bark and later was a manufacturer of straw boards. In 1874 he purchased the mills and water power in Contoocook, later making extensive improvements and additions to them, and in 1890 erected a large silk factory. He was an inventor of note and maintained a large machine shop in connection with his mills.

—William S. Johnson, who was well-known in the Oranges and in New York, where he was prominent for many years in the woolen trade, died suddenly in East Orange last month. Mr. Johnson was born in Brooklyn in 1849. For nearly 30 years he was associated with Deering, Milliken & Co., and was for many years a member of the firm.

—William W. Spear, employed for many years in the Jackson Mfg. Co., Nashua, N. H., as secondhand and overseer of the cloth room, died recently at his home, 5 Jackson Square. He was born in this city June 15, 1859.

—James Whitaker, a well-known carpet manufacturer, died at his residence, 2031 North Front St., Philadelphia, Pa., after several days' illness of pneumonia.

—James L. Bowes, of J. L. Bowes & Bro., wool brokers, Liverpool, died recently, aged 70 years.

—Nelson M. Nay, of Milton, N. H., died November 2d. He spent many years in woolen mills, and from 1855 to 1863 was engaged in business at Hinesburgh under the firm name of Dow, Nay & Co., and then removed to Milton and bought a farm, where he lived for 13 years and then built the house on Main St. where he has since resided. Mr. Nay had a genial and pleasant disposition and was most honest and upright in all his dealings.

—William B. Richards, employed by the Union Wadding Co., Pawtucket, R. I., as gateman for over twenty years, died recently.

—John Galvin died Friday afternoon, Nov. 10th, at his home in Tin Town, Va. His death was most unexpected. Mr. Galvin was born in Providence, R. I. For several years he worked in the woolen mills of the late Col. Joseph F. Kent and since then had lived in Tin Town, a part of Wytheville, Va. He was a skilled woolen mill man and was respected and esteemed by all who knew him.

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EASY
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SLIPPING

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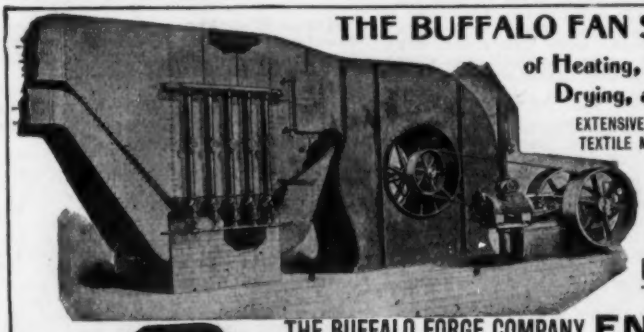

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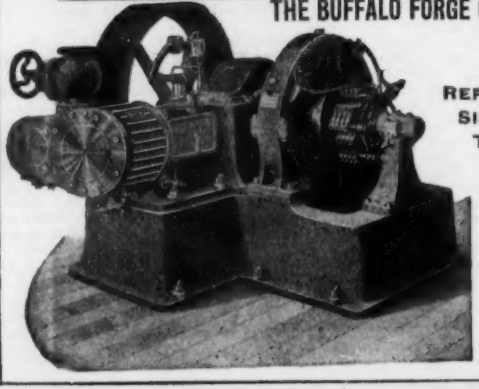

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BUYERS' INDEX.

Advertisers whose names do not appear under desired headings will please notify the publishers. Such omissions are accidental, not intentional.

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Architects and Mill Engineers.

Berlin Iron Bridge Co, The, East Berlin, Ct.
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Tower & Wallace, Broadway and 25th St., New York, N. Y.

Automatic Feeds for Cotton and Wool.

Woonsocket Machine & Press Co, Woonsocket, R. I.

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Torrance Mfg. Co, 18 Davis St, E. Newark, N. J.

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Chemicals and Apparatus.

Bullock & Crenshaw, 528 Arch St, Phila, Pa.
Roessler & Hasslacher Chemical Co, 100 William St, New York.

Chemist.

Adriance, John S., 105 East 39th St., New York.

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The Eastern Machinery Co., New Haven, Conn.
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American Tool & Machine Co., Boston, Mass.

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American Yarn Printing Works, 134-150 North 22d St., Philadelphia.
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Orianna Bleach Works, 2550 No. 3d St., Philadelphia.
Pawtucket Dyeing & Bleaching Co, Pawtucket R. I.
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Woonsocket Machine & Press Co, Woonsocket, R. I.

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Haedrich, E. M, 311 1-2 Walnut St, Phila, Pa.

Dyestuffs and Chemicals.
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American Aniline Co., 138 No. Front St., Philadelphia.
Anchor Color Mfg. Co, 464 Cherry St, New York.
Atteaux, F. E. & Co., 174-176 Purchase St Boston.
Berlin Aniline Works, 72 Front St., N. Y.
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N. Y. & Boston Dyewood Co, 55 Beekman St, New York.
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Pickhardt & Kuttroff, New York.
Richmond & Foley, 225 N. Front St., Philadelphia.
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Stone & Ware Co, The, 157 Maiden Lane, N. Y.
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Howard, Geo. C., 1783 Barker St., Phila., Pa.

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Electric Motors.
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Hunter Jas, Machine Co, No. Adams, Mass.

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D. L. Witmer & Bro, 5th St. and Germantown Ave, Philadelphia.

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Witmer, D. L, & Bro, 5th St. and Germantown Ave, Philadelphia.

Jacquard Card Boards.
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Knit Goods Edgings, Trimmings, etc.
Cathcart, John & Co., 115 Franklin St., New York.
Cheney Bros, Silk Goods, 479 Broome St, N. Y.
Friedberger & Co, Edgings, Germantown Phila, Pa.
Hepner & Horwitz, Lacings, 30 Howard St, N. Y.
Krout & Fite Mfg. Co, Allegheny Ave. and Emerald St., Phila.
Weimar Bros, 1817 East York St, Phila. Pa.

Knit Goods Finishing Machines, Crochet, Etc.
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Hepworth & Co, Lehigh Ave. and Mascher St, Phila, Pa.
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Fairmount Machine Works, 22d and Wood Sts. Philadelphia.
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Measuring and Folding Machines.
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Elliott & Hall, 544 Hermon St, Worcester Mass.

Mercerizing Machinery.
Butterworth, H. W. & Sons, Philadelphia.
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Mills For Sale.
Denny, R. B., 143 Federal St., Boston.

Mill Builders and Engineers.
Berlin Iron Bridge Co, The, East Berlin, Ct
Ferguson, John W, Paterson, N. J.

Mill Supplies.
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Jones, Lewis, 60 1-2 and Media Sts., Philadelphia, Pa.

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Pantagraphs for Mill Engraving.
Johnson, C. A, & Co, 22 Dey St, New York.

Patterns of European Novelties.
European Pattern Supply Co., 530 Broadway, N. Y.
European Textile Sample Co., 56 Worth St., New York.

Patent Solicitors.
Crosby & Gregory, 24 School St, Boston, Mass.
Siggers, E. G., Washington, D. C.
Wright, Brown & Quinby, 53 State St, Boston, Mass.

Perforated Metal.
Beckley, A. J. & Co., Garwood, N. J.
Harrington & King Perforating Co., 230 North Union St , Chicago. Ill.

Peroxide of Sodium.
Roessler & Hasslacher Chemical Co., 100 William St, New York.

Picker Sticks.
La Bar, L. T., Beateyestown, N J.
Loom Picker Co., Biddeford, Me.

Picking, Carbonizing and Garnetting.
Garfield Woolen Co, Garfield, N. J.

Pipe Covering (Magnesia).
Keasby, E. A. 83 Warren St, New York.
Norristown Covering Co., Ltd., Norristown, Pa.

Pneumatic Conveying.
See Ventilating.

Porcelain Guides.
Mitchell-Bissell Co., 170 Summer St., Boston.

Power Transmitting Machinery.
Ameledema Oilless Bearing Co, 149 West Berkley St, Wayne Junction, Pa.
Channon, H, Co, 25 Market St, Chicago, Ill.
Christiana Machine Co., Christiana, Pa.
Eastern Machinery Co, New Haven, Conn.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunter, Jas, Machine Co, No. Adams, Mass.
Kilburn, Lincoln & Co, Fall River, Mass.
Link Belt Machinery Co, Chicago, Ill.
Saginaw Manufacturing Co., Saginaw, Mich.
Wall, William F. Rope Company, 56 South St., New York.

Presses.
Boomer & Boschet Press Co., 338 West Water St., Syracuse, N. Y.
Butterworth, H. W. & Sons Co., Philadelphia
Crawford. J. J, & Son, Nashua, N. H., (Power Screw, Hydraulic, Hollow Steam Plate.)
Curtis & Marble Machine Co, Worcester, Ms.
Hart, Charles, Frankford, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Phillips Co, The Thomas, Providence, R. I.
Sullivan Machinery Co., Claremont, N. H.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Pressing Irons, Gas and Air Heated.
Edwards Sad Iron Co , 1420 Chestnut St., Philadelphia.

Printers and Embossers.
Novelty Textile Printing Co, 447-449 W. 14th St, New York.

Pulleys.
See Power Transmitting Machinery.

Pumps.
Goulds Mfg. Co, Seneca Falls, N. Y.

Quills.
Parker, Henry, Co., Springfield, Vt.

Reed and Harness Manufacturers.
American Supply Co, Providence, R. I.
Walder, J, Paterson, N. J.

Ribbons.
Cheney Bros, S. Manchester, Ct.

Roofing, Gravel, Slag and Composition.
Armitage Mfg. Co, Richmond, Va.
Eastern Granite Roofing Co., Jersey City N. J.

Roofing, Paint and Paper.
Armitage Mfg. Co, Richmond, Va.
Billman, C. W. Philadelphia.

Roving Cans and Sheet Metal Work for Mills.
N. E. Ventilating & Heating Co, 930 Manton Ave. Providence, R. I.
Sullivan Machinery Co, Claremont, N. H.
Walrus Fibre Mfg. Co., Medford, Mass.

Rubber Squeeze Rolls.
Clark, Geo. P. Windsor Locks, Conn.

Saddles and Stirrups.
Dixon Lubricating Saddle Co., Bristol, R. I.

Schools.
American Correspondence School of Textile, New Bedford, Mass.
Lowell Textile School, Lowell, Mass.
New Bedford Textile School, New Bedford, Mass.
Philadelphia Textile School, Phila, Pa.

Screens (Perforated.)
See under Perforated Metal.

Sewing Machines and Supplies.
Birch Bros., Somerville, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Frame, Gibbons, 2nd and Diamond Sts, Phila, Pa.
Manufacturers' Supplies Co , 66 No. 4th St., Philadelphia.
Nye & Tredick, 606 Arch St, Phila, Pa.
Standard Sewing Machine Co, Cleveland, Ohio.
Scott & Williams, 6th and Arch Sts, Phila, Pa.
Union Button Sewing Machine Co., 164 High St., Boston, Mass.

Shearing Machinery.
See Dyeing, Drying, Bleaching and Finishing.

Shell Rolls.
Cohoes Foundry & Mach. Co, Cohoes, N. Y.
Thurston, A. G, & Son, Box 528, Fall River, Mass.

Shoddies.
See Wool Shoddies.

Shuttles.
See Bobbins, Spools, Shuttles, Etc.

Shuttle Eyes.
Mitchell-Bissell Co., 170 Summer Street, Boston

Silk (Tussah.)
Corne[illegible], Chailly & Co., 339 East 107 St , New York.

Silk Machinery.
Butterworth, H. W. Sons Co, Philadelphia.
Granger Foundry & Machine Co., Providence, R. I.
Mason Machine Works, Taunton, Mass.

Stage Plates.
Butterworth, H. W. Sons Co., Philadelphia.
New Bedford Copper Co, New Bedford, Mass

Sizing, Starch and Gums.
Stein, Hirsch & Co, 165 Duane St, New York.

Slashers.
Cohoes Foundry & Machine Co, Cohoes, N. Y.
Lowell Machine Shop, Lowell, Mass.
Phillips C , The Thomas, Providence, R. I.

Soaps.
Holbrook Manufacturing Co., New York.
India Alkali Works, Boston, Mass.

Spindles.
Bamford & Smith, Pascoag, R. I.
Buckley, Benj's, Sons, Gun Mill, Paterson, N. J.
Draper Company, Hopedale, Mass.
Easton-Burnham Co., Pawtucket, R. I.
Ward & Vandegrift, Elmer, N. J.
Whitin Machine Wks, Whitinsville, Mass.

Spindle Hook Bands.
Geo. T. Frost, Paterson, N. J.

Spindle Tubes.
Bamford & Smith, Pascoag, R. I.

Spinning Cylinders.
N. E. Ventilating & Heating Co, 900 Manton Ave, Providence, R. I.

Spinning Frames.
See Cotton Machinery.

Spinning Frames for Wool
Woonsocket Machine and Press Co., Woonsocket, R. I.

Spinning Rings.
Draper Company, Hopedale, Mass
Morley Button Mfg. Co., Boston, Mass.
Whitinsville Spinning Ring Co, Whitinsville, Mass.

Spinning Tubes.
Buckley, Benj's. Son, Gun Mill, Paterson, N. J.

Spools. *See Bobbins, Spools Shuttles, Etc.*

Steam Boilers.
Brown, C. H, & Co, Fitchburg, Mass.
Lee-Odlum Co., Memphis, Tenn.

Steam Boiler Compound.
Straus & Co., 55 Broad St., New York.

Steam Boiler Insurance.
Hartford Steam Boiler Inspection & Insurance Co, Hartford, Conn.

Steam Engines.
Brown, C. H, & Co, Fitchburg, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Hooven (The), Owens & Rentschler Co, Hamilton, O.
Sturtevant, B. F. & Co., Boston.

Steam Specialties.
Butterworth, H. W. Sons Co., Philadelphia.
Sturtevant Co., B F., Boston.

Tanks, Tubs and Vats.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Corcoran, A. J, 11 John St, New York.
Cypress Lumber Co, Apalachicola, Fla.
Lee-Odlum Co., Memphis, Tenn.
Stearns, A. T, Lumber Co, Neponset, Mass.
Vaughn Machine Co., Peabody, Mass.
Woolford, George, 2240 No. 9th St, Phila, Pa.

Tapes, Braids and Edgings.
Cathcart, John, & Co, 115 Franklin St, N. Y.
Fleming & Chapin, 239 Church St., Phila.
Friedberger Mfg. Co, Germantown, Pa.
Hamilton, J. H , & Co, 275 Church St, N. Y.
Krout & Fite Mfg. Co., Allegheny Ave. and Emerald St., Philadelphia.
Weimar Bros, 1817 East York St, Phila, Pa.
Young, Wm. M, 3638-40 Frankford Ave, Philadelphia, Pa.

Telephones.
Mianus Electric Co., Mianus, Conn.
Plummer, F. O. 620 Atlantic Ave., Boston.

Tentering Machines.
See Dyeing, Bleaching Machinery, Etc.

Tension Pulleys.
N. E. Ventilating & Heating Co, 900 Manton Ave, Providence, R. I.

Testing Machines.
Howard, Geo. C., 1783 Barker St., Phila., Pa

Towers.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Lee-Odlum Co., Memphis, Tenn.

Trucks.
Armstrong Truck Co., Philadelphia.

Turbines.
(See Water Wheels.

Ventilating Apparatus.
Allington & Curtis Mfg. Co., Saginaw, Mich., and East Cambridge, Mass.
American Air Moistening Co., Boston.
Berger Bros. Co., 231-237 Arch St., Philadelphia.
Berry, A. Hun, 23 W. 1st St, Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Mattern, Geo. 44 East 8th St., New York.
New England Ventilating & Heating Co, Providence, R. I.
Philadelphia Drying Machinery Co., 6731 Germantown Ave., Philapelphia.
Philadelphia Textile Machinery Co, Hancock St, above Lehigh Ave, Phila, Pa.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Washers (Cloth).
Birch Brothers, Somerville, Mass.
Butterworth, H. W. & Sons Co., Philadelphia.
Hopkins, Machine Works, Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Phillips Co, The Thomas, Providence, R. I.

Waste Unraveller.
Whiteford, R. A. P. Philadelphia.

Watchman's Clock.
Eco Magneto Clock Co, 620 Atlantic Ave, Boston.
Nanz & Co, 127 Duane St., New York.

Water Wheels.
Bradway, C. P., W. Stafford, Ct.
Christiana Machine Co., Christiana, Pa.
Hunt, Rodney, Machine Co, Orange, Mass.
Leffel, James, & Co, Springfield, O.

Water Wheel Governors.
Bradway, C. P, West Stafford, Ct.
Cohoes Foundry & Machine Co, Cohoes N. Y.
Leffel, James & Co, Springfield, Ohio.
Lombard Water Wheel Governor Co, 61 Hampshire St, Boston.

Winders. (Hosiery.)
Universal Winding Co, 226 Devonshire St, Boston.

Wood Pulleys.
Saginaw Manufacturing Co, Saginaw, Mich.

Wool Cleaning Compound.
India Alkali Works, Boston.

Wool Combing Machinery.
Leigh, Evan A. 35 Mason Bldg., Boston.

Wool Extracts.
Garfield Woolen Co, Garfield, N. J.

Wool and Waste Dusters.
Gerry, Geo, & Son, Athol, Mass.
Sargents', C. G., Sons, Graniteville, Mass.
Stillman-Randall Machine Co, Westerly, R. I.

Woolen and Worsted Machinery.
Altemus, W. W, & Co, 2816 N. 4th St, Phila Pa.
American Tool and Machine Co., Boston.
Birch Brothers, Somerville, Mass.
Butterworth, H. W. Sons Co., Philadelphia.
Cobb, Thad. S., Machinery Co., Lowell, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Works, 23d and Wood Sts, Philadelphia.
Furbush, M. A. & Son Machine Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Kenyon D. R. & Son, Raritan, N. J.
Leigh, Evan A, 35 Mason Bldg, Boston.
Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philadelphia.
Philadelphia Textile Machinery Co., Hancock and Somerset Sts., Philadelphia.
Phillips Co. The Thomas, Providence, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Woonsocket Machine & Press Co Woonsocket, R. I.

Wool, Hair and Noils.

Becker, Chas. W, Agt, Amsterdam, N. Y.
Fowles & Co, 106 Church St, Phila.

Wool Shoddies.

Becker, Chas. W, Agt, Amsterdam, N. Y
Garfield Woolen Co, Garfield, N. J.
Slack, Wm. H. B., & Bro, Springfield, Vt.

Wool Sorters, Scourers and Carbonizers.

Morse Wool Treating Co., Norton, Mass.

Wool Washing, Preparing and Drying Machinery.

Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philadelphia.
Phillips Co, The Thomas, Providence, R. I.
Sargent's, C. G, Sons, Graniteville, Mass.

Woolen Commission Merchants.

Dusenberry, C. Coles, 396 Broadway, New York.
Hayes, O. H. & Co., New York.

Yarns, Threads, Etc.

Banding.

Frost, Geo. T, Paterson, N. J.
Moore, C. & Co, 12 S. 5th St, Phila, Pa.
Warren, W, Thread Works, Westfield, Mass.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.
Tucker & Cook Mfg. Co, Conway, Mass.
Whittier Cotton Mills, Lowell, Mass.

Cotton Yarns.

American Cotton Yarn Exchange, 45 Milk St., Boston.
Catlin & Co, New York and Boston.
Clark, Wm, Co, Westerly, R. I.
Cohannet Mills, Taunton, Mass.
Eddy & Street, Providence, R. I.
Spring St., N. Y.
Fleming & Chapin, Philadelphia.
Germantown Spinning Co, Germantown, Pa.
Grant Yarn Co, Fitchburg, Mass.
Greene & Daniels Mfg. Co, Pawtucket, R. I.
Hadley Co, Holyoke, Mass.
Indian Orchard Co., Indian Orchard, Mass.
Jenckes, E., Mfg. Co., Pawtucket, R. I.
Mitchell, Jas. K, & Co, Boston and Phila, Pa.
Montgomery, J. R, Co, Windsor Locks, Ct.
Monument Mills, Housatonic, Mass.
New England Thread Co., Pawtucket, R. I.
Orswell Mills, Fitchburg, Mass
Tucker & Cook Mfg. Co, Conway, Mass.
Whittier Cotton Mills, Lowell, Mass.

Gassed Yarns.

Greene & Daniels Mfg. Co, Pawtucket, R. I.

Glazed Yarns.

Indian Orchard Co., Indian Orchard, Mass.
Lorimers, Wm. H. & Sons Co., Philadelphia.
Malcolm Mills Co, Frankford, Pa.
Meyer, John C. & Co., 87 Summer St., Boston.
Montgomery & Co, J. R, Windsor Locks, Ct.
New England Thread Co., Pawtucket, R. I.
Warren, W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Harness Twines.

Cranston Worsted Mills, Bristol, R. I.
Fawcett, Hughes, 115 Franklin St., N. Y.
Hadley Co, 95 Milk St, Boston, Mass.
Moore, C., & Co., (S. W. cor. 5th and Market Sts.)
Warren, W, Thread Works, Westfield, Mass
Whittier Cotton Mills, Lowell, Mass.

Hosiery and Knitting Yarns.

Boyer, B. F, & Co, Camden, N. J.
Campbell, Geo, & Co, Phila, Pa.
Champlain Silk Mills, Whitehall, N. Y.
Clark, Wm, Co, Westerly, R. I.
Clasgens, The J. & H. Co. New Richmond, Ohio.
Cohannet Mills, Taunton, Mass.
Colchester Mills, 86-88 Franklin St, New York.
Cranston Worsted Mills, Bristol, R. I.
Germantown Spinning Co, Germantown, Pa.
Greene & Daniels Mfg. Co, Pawtucket, R. I.
Hyde, E. S, 223 Chestnut St, Phila, Pa.
Jenckes, E., Manufacturing Co, Pawtucket, R. I.
Mitchell, James E, & Co, Phila. and Boston
Monument Mills, Housatonic, Mass.
Orswell Mills, Fitchburg, Mass.
Skerry, A T, & Co, 47 Leonard St, N. Y.
Walcott & Campbell Spinning Co, New York Mills, Oneida Co, N. Y.
Warren, W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Flax, Hemp, Jute and Ramie.

Fawcett, Hughes, 115 Franklin St., N. Y

Mohair Yarns.

Cranston Worsted Mills, Bristol, R. I.
Skerry, A. T, & Co, 47 Leonard St, N. Y.

Novelty Yarns, Tinsels, Silk Noils, Etc.

Champlain Silk Mills, Whitehall, N. Y.
Cranston Worsted Mills, Bristol, R. I
Indian Orchard Co., Indian Orchard, Mass.
Malcolm Mills Co, 229 Chestnut St, Phila, Pa.
Montgomery & Co, J. R, Windsor Locks, Ct.
Skerry, A. T, & Co, 47 Leonard St, N. Y.

Silk Yarns.

Champlain Silk Mills, Whitehall, N. Y.
Cheney Bros, S. Manchester and Hartford Ct.
Eddy & Street, Providence, R. I.
Meyer, John C, & Co., 87 Summer St., Boston.
Ryle, Wm, & Co, 54 Howard St, N. Y.

Woolen and Merino Yarns.

Boyer, B. F, & Co, Camden, N. J.
Clasgens, The J. & H. Co, New Richmond Ohio.
Eddy & Street, Providence, R. I.
Hyde, E. S, 223 Chestnut St, Phila, Pa.
Jenckes, E. Mfg. Co., Pawtucket, R. I.
Skerry, A. T, & Co, 47 Leonard St, N. Y.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.

Worsted Yarns.

Alleghany Worsted Mills, Phila, Pa.
Boyer, B. F, & Co, Camden, N. J.
Campbell, Geo. & Co, Phila, Pa
Campion, Richard, 17 Bank St., Philadelphia.
Cranston Worsted Mills, Bristol, R. I.
Croft, Howland, & Sons, cor. Broadway and Jefferson Ave., Camden, N. J.
Elsasser, Albert R, Addingham, Pa.
Goff, D. & Sons, Pawtucket, R. I.
Herbst & Jones, 21st and Naudain Sts Philadelphia, Pa.
Pocasset Worsted Co., Thornton, R. I.
Skerry, A. T, & Co, 47 Leonard St, N. Y.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.
Waverly Worsted Co, Main St. and Green Lane, Manayunk, Pa.

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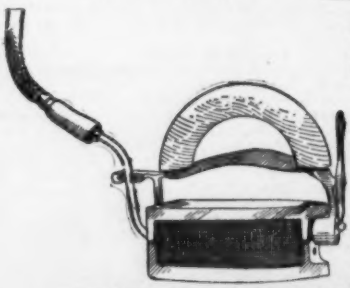

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This book gives original calculations relating to cotton spinning, giving the position of the different pulleys and wheels, which are taken into consideration when making calculations; and also points where the necessary changes are made when altering from one count to another. Price $1.

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This book is intended to be a complete practical work dealing with everything relating to the modern processes of sizing, and takes up such subjects as sizing ingredients (flours, softeners, deliquescent substances); Size preparations (Chloride of Zinc, Whitening material, Percentage of size, etc.); Fermentation; Mixing; Construction of Sizing Machine; Working of the Machine; Definition of Technical Terms; Calculation, etc. Price $1.00.

Ornamental Design for Woven Fabrics, by Stephenson & Suddards. 273 pages, 66 illustrations.

This is a text book dealing with ornamental design for woven fabrics, for the use of the student, and has been written for the purpose of suggesting helpful ideas to designers and manufacturers of textiles, and aims at bringing artistic textile work into practical touch and closer relationship with the technical requirements of manufacturing. It takes up such subjects as Geometric Design; How to Plan an All-over Repeating Design; The Drop Pattern; The Sateen Arrangements; Borders, Corners, Stripes; The Structure of Ornamental Flowers, Foliage, etc. Price $2.50.

Cotton Spinning. By W. S. Taggart Three volumes. Price $7.50.

This work treats of the subject in an exhaustive way, from the first operations in the picking, to the last in the spinning department. The various parts of the subject have been treated in such a manner that the young student may greatly benefit himself and use it as a text-book, while the older readers will find in them much of interest, in satisfying a desire for a fuller knowledge and a more perfect grasp of the principles underlying many of the processes in much of the mechanism of cotton spinning machinery. A spinner can make no mistake in procuring this work.

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Cotton Weaving and Designing, by John R. Taylor, 288 pages, fully illustrated.

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Woolen Spinning, by Charles Vickerman.

This is a most excellent work for students in textile schools, and for skillful, practical men in woolen mills. It takes up the principles that underlie the various processes and operations of the earlier parts of manufacture. It has chapters devoted to Wool; Wool Sorting; Scouring; Bleaching; Mixing, etc., Carding and Spinning. 352 pages. Price $1.75.

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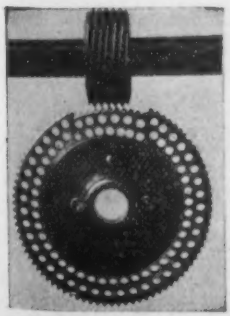

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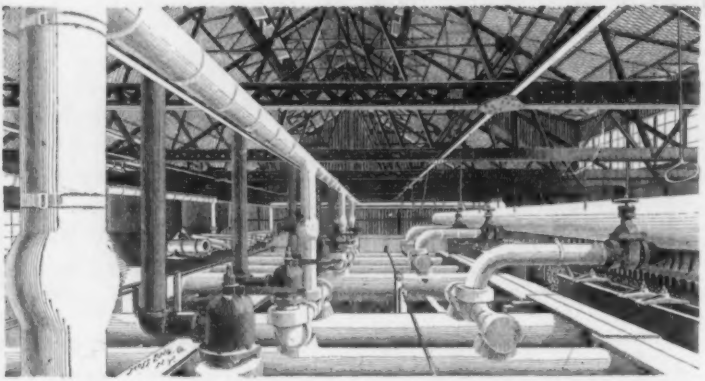

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The business of this department is held strictly confidential.

The applications of good overseers in every department, who are in want of positions, are solicited.

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1546 **Agent or Supt. Woolen Mill.** Age 38; married. 15 years' experience in Scotland and America in woolen trade. Cassimeres, Scotch cheviots and fancies and Irish friezes a specialty, both colors and make up. At present in position, but anxious to have full charge of 8 or 10 set mill. Best references.

935 **Woolen Supt. and Designer.** Graduate of German Textile School. Has managed successfully two mills in the West. Thoroughly up on designing and general mill management. Age 35. Married. References first-class.

1570 **Supt. or Designer** of small woolen mill. Practical experience in carding, dressing, finishing and designing departments, on fine and low grade cassimeres, blankets, jeans and low grade worsteds. Temperate, American, age 33. Fine record. Now out of work because of change in line of goods at mill where he has been working.

1349 **Woolen Supt. or designer.** Has been 12 years superintendent of 20 set mill in Conn., until recently, when he resigned on account of children's schooling. Has also been designer and pattern weaver. High character and first class ability. Age 39; American, married. Experience on worsteds, cassimeres, cheviots, ladies' fancy dress goods, etc.

1575 **Assistant Supt. Woolen.** A graduate of the Philadelphia Textile School (highest standing), and has had more than 7 years' experience in the various departments of a Massachusetts mill. Wants to get a start where there is fair chance of advancement. Age 28, single.

218 **Woolen Superintendent, Designer or Boss Weaver.** Age 35; American. Has worked on all classes of dress goods and men's wear. Can furnish good references and will accept a moderate salary.

1386 **Woolen Superintendent or Boss Carder.** Age 43; American. Familiar with the manufacture of all kinds of woolen goods, is well recommended, and can go immediately.

1606 **Woolen Supt.** 24 years' experience as supt and manager. Several years manager of his own plant. At present out of position owing to consolidation. Would make a successful manager of a moderate sized plant, making plain or fancy cassimeres, doeskins or felt goods. Best of references.

1610 **Woolen Supt. or Dyer.** Large experience as dyer and assistant supt. on broadcloths, kerseys, dress goods and men's wear. Age 36; American, married.

COTTON SUPERINTENDENTS.

189 **Cotton Superintendent** wants position in Northern mill. Has been in charge of Southern mills for 7 years. Previous experience in N. E. Is well known among mill men, and can furnish the best of references. Age 35; married.

1496 **Superintendent or Boss Weaver.** Age 45; single. Large experience on all classes of cotton goods and all makes of American machinery. At present employed, but wishes to obtain a better position. Now in charge of 1800 looms. Is willing to go South.

1532 **Superintendent.** Has been in mill business all his life, and been with the present firm for a number of years, having been promoted several times. He wishes to better himself.

1306 Young American wants position as cotton superintendent. Experience mostly on cotton warps. Has been bookkeeper, overseer of carding and spinning; also superintendent in Massachusetts mills.

1486 **Superintendent** or will take a position as boss spinner in a large room. Age 43; American. Experienced mostly on plain goods. At present employed as overseer.

1464 **Superintendent of Fancy Cotton Weaving.** Age 43; married; an American. Will not work outside Northern and Eastern states. Has worked on fancy goods of all kinds, white and colored cottons, worsteds and silks. Is familiar with all makes of looms and dobby heads. Is at present employed, but wishes to better himself, if possible. Refers to present and past employers.

1453 **Superintendent** desires position in a cotton mill. Age 26; married; American. Has worked on prints, fine sateens, sheeting ginghams, duck, denims, cottonades, ticks, awnings and domets. Is familiar with all makes of spinning, spooling and warping machinery. At present employed, but wishes to obtain a more advanced position. Refers to present and past employers.

1624 **Cotton Supt.** A young man who has been through all departments of cotton cloth mill would like position as assistant supt. or in charge of a small mill, or would take a good boss spinning job. Very well recommended, and a young man of great promise.

1608 **Cotton Yarn Supt.** A man capable of taking charge of all departments of yarn mill. Would accept $1500 a year. Brought up in N. E. mills and has been assistant supt. of a first-class plant for seven years. Age 31; American, married. Would prefer a Southern mill.

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1578 **Wool or Worsted Carder.** 20 years' experience as overseer, with excellent references. Understands almost all kinds of machines. Would also consider position as traveling agent for mill supplies, as he has a large acquaintance with mill men.

1630 **Boss Carder or Comber.** 10 years' experience as second hand of carding and combing. Would like to secure an overseer's position at $3.00 a day. Has worked on all grades of foreign and domestic wools and is highly recommended by present and past employers. Englishman; age 25, married.

1643 **Woolen Carder.** Age 45; American; married. Has worked as overseer in first-class N. E. mills for the past 18 years. He is at present employed, but wishes to better himself. Could leave on a week's notice. Has worked on cassimeres, dress goods, flannels and underwear. A good manager of help and thoroughly competent and reliable.

1638 **Boss Woolen Carder.** Long experience in N. E. mills on both high and low grades. Would consider $3 a day. Excellent references.

1634 **Boss Wool Carder.** Employed for many years in well-known N. E. mill, but would change for position paying $3.50 a day. Is undoubtedly a first-class man and well worth this salary. Best of references.

1600 **Boss Woolen Carder.** Now employed, but desires to change for good reasons. Many years' experience in mills on American and English carding machinery. Age 41; American, married. Can start at once.

1617 **Boss Wool Carder or Second-hand.** Has held several first-class jobs, also has had experience on spinning. Can accept position at once. All grades of stock, including shoddies and cotton and wool and all wool.

1618 **Boss Wool Carder or Second-hand.** Excellent carder. At present out of work. Would like to get started. Experienced on American and English cards. Has had charge of seven set mill. Last position 15 years as overseer. Age 45; married.

COTTON CARDERS.

1403 **Cotton Carder** with 17 years experience in N. E. mills as overseer and second hand, now in the South but wants to return North. Has never worked for less than $3.00 but would take $2.50 to change. Married. Age 38. Best of references.

1593 **Overseer Cotton Carding and Combing.** Now in charge of this department in a large N. E. mill. Has had first-class experience and is well recommended. Age 38; married, American. All grades of cotton.

1320 **Boss Cotton Carder.** Has been overseer for 12 years. Is at present employed, but desires to change for good reasons. Would accept $2.50 a day. Age 40; American, married.

1596 **Cotton Comber and Carder.** Young man with 10 years' experience in N. E. mills. Would like position as overseer or second-hand. Is well recommended. Married. Will start at $2.50 per day.

WOOLEN SPINNERS.

1648 **Boss Woolen Spinner.** 47 years old. 28 years' experience. Worked on all kind of stock, from ¼ to 12 run. Temperate, steady, and refers to past employers. Will work for moderate salary. Not employed and could come at once. Experience on cassimeres, flannels, beavers, knit goods dress goods, blankets, shawls.

1461 **Spinner, on Cotton or Wool.** Age 33; married; French. Has worked in one of the best thread works in this country, also in Alsace-Lorraine, on yarns from 70s to 160s. Is familiar with Dobson & Barlow machines and Schlumberger mules.

1646 **Overseer Spinning or Spinning and Twisting.** Age 38; English, married. Worked in mill in England 13 years and in this country three years as secondhand and two years overseer in N. E. mills. At present employed, but wishes to change to get family better positions. Experienced on worsted yarns, camel hair, mohair, carpet and silk yarns.

1595 **Overseer Worsted Spinning.** 10 years as overseer of spinning, twisting, reeling, dressing, spooling on worsted yarns. English-man; age 41, married. Now employed, but does not like section of country. A first-class man in every respect.

678 **Woolen Spinner.** 18 years' experience as overseer of spinning and carding. Can handle both departments. Would take position in the West. Best of references. Age 43; married.

1601 **Woolen Spinner or Second-hand.** Experience in hosiery and cloth mills. Will accept small wages to get started in satisfactory position.

COTTON SPINNERS.

1647 **Overseer Cotton Mule Spinning.** Seven years' experience as secondhand. Wishes to get an overseer's job. Prefers Mason mules. Age 38; Catholic, married. At present employed. Experience on prints, sateens, lawns, twills, etc. Will work for moderate salary.

1609 **Boss Cotton Mule Spinning,** also ring spinning. Experience on 40's to 150's. A man capable of taking one of the best positions in the country. Held such a position in England until in 1892. Since then has been in N. E. mills. Age 48; married. Would undoubtedly make success as supt., but would accept first class position as overseer.

1619 **Cotton Ring Spinner.** Cotton yarns from 4's to 120's for hosiery, prints, etc., crape and other fancy yarns. Experience in several of the fancy cotton goods mills of N. E. as overseer. Can start at once. Age 40; married.

1636 **Overseer Cotton Spinning, Spooling, Warping, Etc.** Has held position seven years of second-hand and has taken textile school courses. Having had unusual opportunities to learn, he feels competent to take position as overseer. Highly recommended by present employers.

1640 **Overseer Ring Spinning.** Has also had charge of twisting, spooling and beaming. A young man who has had excellent opportunities to learn this department, and has had charge for about a year. Would like to secure a first-class mill. Prefers N. E. or Central States.

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1517 **Overseer Woolen Weaving.** Age 37; married. Has had a large experience on all classes of woolens and worsteds. Will go anywhere

1645 **Overseer Weaving.** Age 30; married, American. Has worked in weave room since he was 17 years old as weaver, fixer and secondhand of weaving, except for a short time was traveling salesman. Has worked on ladies' dress goods, men's fine worsted suitings, overcoatings, cloakings, etc., on Crompton & Knowles and Jacquard looms. Excellent references.

1551 **Boss Weaver,** especially up on plush looms, both wire and double. Has worked in almost every department of woolen mill and would take charge of a small plant at moderate salary. Age 42; married. New England experience.

1581 **Boss Weaver on Woolens** wants position in charge of a room on plain goods. Has worked on both plain and fancy work. At present employed. Can furnish excellent references from past jobs Experience on Crompton & Knowles fancy, Gilbert and Davis & Furber plain looms. Age 40, married.

1629 **Boss Weaver or Second-hand** of woolens or worsteds. Experience covers 10 years in N. E. mills from weaver to second-hand. Will accept a second-hand's position paying $2.50 a day. Well recommended.

1607 **Worsted Weaver or Fixer.** Will accept fixing job at $2.25 a day. Experience covers worsted coatings, cassimeres, dress goods and jacquard work. Familiar with Crompton and English looms.

COTTON WEAVERS.

1623 **Boss Cotton Weaver.** Has been fixer and second-hand in fine goods mills in N E. and Penn. Age 26; English, married. Now employed as second-hand, but would like an overseer's job. Splendid references from present employer.

1605 **Overseer Cotton Weaving,** especially on fancies and leno. Has also worked on plain goods. Many years' experience in N. E. mills, starting as a fixer. Age 36; French, married.

1633 **Cotton Weaver.** At present in charge of over 300 looms in a South ern mill. Would like to change and would take position in the South at $2.50 a da. Well recommended. v.

1572 **Overseer of Cotton Weaving,** now employed in first class mill as second-hand, but would like to have charge of a room at $3 a day. Experience covers sheetings, sateens, drills, flannels, denims and stripes of all kinds Lowell and Whitin looms. American; age 32, married. Excellent references from present and past employers.

1563 **Overseer Cotton Weaver** who has long experience as fixer, second hand and overseer on all kinds of cotton and silk looms. Splendid references from past employers. At present employed. Age 40; married.

1642 **Overseer of Weaving.** Young married man who has had practical experience on cotton goods from the coarsest to the finest counts, including lenos and towels. Could do his own picking. If necessary. At present employed as second hand in large N. E. mill. Excellent references from present and past employers.

KNITTERS.

1544 **Underwear Knitter.** 10 years' experience on ribbed underwear. Has run silk, worsted, lisle, cotton and mixed yarn. Best references from present employer, with whom has worked four years Can leave at once.

1597 **Boss or Second-hand Underwear Knitter** Can accept position at once. Experience covers men's, women's and children's high, medium and low grades. Scott & Williams, Nye & Tredick, Snyder & Fisher machines.

889 **Boss Knitter or Finisher** on latch needle underwear. Large experience. At present employed, but could change on two weeks' notice. Best of references.

1628 **Underwear Knitter.** Good training. All kinds of machines. At present in charge of 85 frames, 11 years' experience. Age 28; American. Would change for $3 a day.

1631 **Hosiery Supt.** Has had charge of knitting departments in N. E. mills and has started several Southern hosiery mills. Experience covers cotton, wool and silk hosiery, gloves and mittens, and most all makes of machines. Very well recommended Can take position at once.

1603 **Overseer Underwear Knitting** Fleece lined goods a specialty. Long experience on many kinds of machines. Has also made hosiery. Will go anywhere except to Canada. First-class references.

1554 **Boss Knitter.** Underwear, Jersey ribbed, lisle, wool, plaited work, silk Can handle any latch machine. Good references. Age 26; married.

DYERS.

1531 **Boss Dyer.** American; Age 32; unmarried Has had a large experience on raw stocks, rags, worsteds, yarns pieces, cassimeres, kerseys and dress goods. Not at present employed. Can take position immediately.

1505 **Boss Dyer** on all classes of wool, woolen and worsted yarns, cotton warps, indigo, etc. Desires to change to better himself.

1476 **Boss Dyer.** Experience on kerseys, broadcloths, dress goods, cassimeres and worsted piece dyes. Has been in good mills for 3, 5 and 7 years and gave satisfaction. Would start in New England or Central States for $3.00 a day.

1612 **Dyer** on piece dye dress goods, long chain cotton yarn, cotton, raw stock. Prefers position in N. E. or New York state. Training in one of the best mills in N. E., and at present holds position as sample dyer. Excellent references. Age 28.

1626 **Dyer and Finisher,** with experience on plushes, dress goods, mohair and worsted genapped yarns, cotton and woolen yarns, raw stock. At present employed, but will consider position paying $3 a day.

1057 **Boss Dyer** on cotton, woolen, merino hosiery, yarns, piece dye dress goods, rubber linings, felts, fast blacks, also mercerized cotton yarns and hosiery. Would expect good wages and can show excellent references.

1644 **Overseer Aniline Black and Turkey Red Dyer** Has had ten years' experience as secondhand in mill where he now is, but wishes to change to better himself. Can take a position at once. Has worked on sateens, cambrics and linings of all kinds. Age 24; English, single.

DESIGNERS.

1635 **Designer** on colored cotton dress goods, and shirtings, and fancy worsted dress goods, piece dye, jacquard work in cotton, silk filing, also tappets. Would not consider position paying less than $1200 a year. Is at present employed in one of the leading mills, making fancy cotton, and is an especially bright young man. Early training in Scotland. Has been in this country about four years

1586 **A Young Designer** With training in a German Textile School and Norwegian Woolen Mills, has recently arrived in this country and would like to connect himself with the designing department of some first class mill. At present temporarily employed and can give American references. A bright, young Norwegian, who will doubtless develop into a first-class designer.

1625 **Assistant Supt. or Designer** on woolens. Has been through all departments of woolen mill and has taken a Philadelphia Textile School course. Practical experience on fancy cassimeres, coverts, hairlines, ladies' dress goods. Very well spoken of. Hard worker.

1622 **Designer or Assistant Supt.** in woolen mill. Has made a specialty of steamer rugs and plaid back dress goods. Will start at $3 a day. Desires to change from present position on account of wife's health. An excellent opportunity to secure a first-class man at moderate wages.

1599 **Assistant Designer.** A young man who is studying woolen and worsted designing would like an opportunity to get practical experience, and will accept very small wages Has worked in mill for two years as weaver on Crompton & Knowles looms. Excellent references as to character.

1598 **Woolen Designer or Supt.** Many years' experience in well-known mills. At present out of work. Can refer to well-known mill men, and will accept moderate wages until he can demonstrate his ability.

1621 **Designer or Assistant Supt.** on men's wear worsteds, cotton worsteds, overcoatings, cassimeres. High and low stock. Has been designer in several first class mills. Age 34; married.

FINISHERS.

1526 **Foreman of Finishing Room,** Folding Packing, etc. Age 45; married; English. Has worked on white and colored goods and prints. Is acquainted with every kind of machinery used in his business. Has worked 11 years in this country. Can give good references.

1494 **Finisher on Felts,** or will take a position for the making of sizing. Age 26; single. His last position was engineer and in charge of sizing and finishing all classes of felts. Good references.

1649 **Overseer and Finisher in Fancy Cloth Room** One of the best men in this line is open for a position. Wide and long experience in leading mills on all sorts of fancy colored goods, including cottonades, tickings, shirtings, ginghams, dress goods, and napped goods of all kinds, also worsteds We can thoroughly endorse this man in every respect.

1376 **Overseer Finishing.** Age 35; American, married. At present employed, but can take position at week's notice. Experienced on fancy worsteds, kerseys, cassimeres, cloakings, carriage and casket cloths, dress goods, meltons and cadets. Can furnish good references as to character and ability.

MISCELLANEOUS.

1571 **Woolen Salesman,** who has filled successfully all positions in woolen jobbing house, desires a position with manufacturer or dealer in textile goods. Fine business qualifications and A 1 references.

1418 **Cloth Hall.** Overseer, shipping clerk or paymaster. Has had a thorough experience in each of the above positions and is familiar with white and colored cotton goods. Is well recommended. Aged 35. Married, and is also a good all around accountant.

1488 **Boss Carpenter or Master Mechanic.** Age 46; American. Is acquainted with all makes of cotton machinery, and is a good man on shafting, wood work, etc. At present employed, but wishes to better himself.

1557 **Bleacher,** overseer or second hand. Well recommended, good training, reliable. Wants $2.50. Age 27; married.

1558 **Supt. of Bleaching,** dyeing and finishing, of all classes of cotton piece goods, plain and figured, desires a position. Has had over 20 years' experience in managing help, and has a thorough knowledge of the business in all its branhes es. Can furnish excellent references from present and past employers.

1555 **Silk Superintendent.** Experience in all departments of a large and successful mill; serges, sateens, linings. Young man but well qualified to take charge or act as assistant superintendent. Knowledge of office work and prices as well as machinery.

1583 **Overseer of Cloth Room.** A young American, married, would like a position as office assistant, shipping clerk or in cloth room. Has had about six years' experience in Connecticut cotton mills. Will start at moderate wages if there is prospect of future advancement.

1602 **Overseer of Cotton Mixing.** Is at present second-hand in cotton opening room of large N. E mill, and has had several years' experience in this position. Could handle this department satisfactorily. Good references. Age 28; married, American.

1611 **Boss Wool Sorter.** Has had charge of this department in several first-class mills on woolen and worsted grades. First-class references. Age 36, married.

1639 **Silk Supt. or Boss Weaver.** Experience covers ribbons, piece goods, velvets, jacquard, plain and plaids. Has had practical experience as loom fixer, designer and overseer. Early training in Germany and later in some of the best silk mills in this country.

1637 **Silk Finisher or Second-hand.** Has had practical charge of this department for the past two years and wants larger experience. Would change for a very moderate salary, if opportunity for advancement was good.

1500 **Overseer of Drawing Room.** Age 31. Has worked on Mohair, camel hair and carpet stock. Familiar with all kinds of foreign and domestic wool Was 14 years in one position and has excellent references.

1515 **Pay-Master and Shipping** Clerk. Will only work in Southern States. Will accept a moderate salary to begin.

Eastern Yarn Market.

(Continued from page 153.)

One of the largest wool houses in speaking of dollar wool says that it cannot be maintained. The westerners are holding wool for 70 cents which they expect to get in February. Some of the wildest speculators are looking for $1.00 per pound wool. There exists a curious state of affairs among the underwear manufacturers in New York state. They do not appreciate the condition of the wool market, and were it not for the market reports it would be hard to convince them that there was any reason for an advance. The reason for this is that orders have been slow in coming. It is not now a question of what knitters will pay but what they have got to pay.

It is well to remember that wool is the most uncertain article in the world to handle, that the changes are rapid both for higher as well as lower prices. Old wool men remember the great advance which happened after the Boston fire, and again in 1879 to 1880. The boom of two years ago was as great as the present one, and it would seem to be wise policy to be careful and go slow, as the present market is largely a traders' market with a great deal of swapping: although there are undoubtedly large amounts of wool being consumed especially by the worsted spinners. The woolen spinners are in it for good orders, as the prices for worsted yarn are getting so high that manufacturers are working in woolen yarn wherever it is possible.

Cotton Yarn Prices.

The Southern cotton spinners and commission men held an important meeting at Charlotte, N. C., last month. The chief object of the meeting was to make prices fair, and yet so low that no weaver or other user could complain of any excessive figures. It was agreed to give preference to commission men who maintained the association's prices. All commission men present seemed in harmony with the spinners' new schedule adopted as follows:

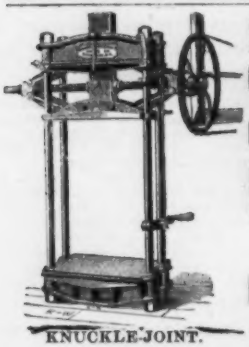
	Skein.	Warps.
3-ply 8s	13½c.	14c.
2-ply 8s	14c.	14c.
2-ply 10s	..	14½c.
2-ply 12s	14½c.	15c.
2-ply 14s	..	15½c
2-ply 16s	15½c.	16½c
2-ply 20s	17c.	18½c
2-ply 24s	18c.	..
2-ply 26s	19c.	19½c.
2-ply 30s	20c.	20½c.
2-ply 36s	24c.	25c.
2-ply 40s	25c.	26½c.

Soft skein yarns same price as warps; single skein yarns, 8s to 16s, inclusive, 1 cent less than 2-ply skein; single skein yarns, 17s to 22s, inclusive, 1¾ cents less than 2-ply skein; single skein yarns, 24s to 26s, inclusive, 2¼ cents less than 2-ply skein; single warp yarns, 8s to 16s, inclusive, ½ cent less than 2-ply warps; single warp yarns, 17s to 22s, inclusive, 1½ cents less than 2-ply warps; single warp yarns, 24s to 30s, inclusive, 2 cents less than 2-ply warps; hosiery yarns, up to 8s, inclusive, 14 cents; 9s to 10s, inclusive, 14½ cents; 11s to 24s, inclusive, raise ¼ cent; 25s up, raise ½ cent.

—There is a new photographic process of preparing textile designs, which has attracted some attention in European textile centres, as possessing valuable features, as showing the possibility of carrying mechanical methods into the realm of designing. It will throw no designers out of employment, because it cannot furnish brain power or the invention of the mind.

—It appears from a recent return that the acreage under flax cultivation in England has fallen off from 895 acres in 1898 to 465 acres in 1899. Lincolnshire has dropped from 109 to 20 acres, Norfolk from 10 to 5 acres. The area in the East Riding, the largest flax growing county, is reduced from 258 acres in 1898 to 106 acres in 1899.

—The business of making hand cards for both woolens and cottons had grown during the Revolutionary war to be one of the most important industries of Boston.



KNUCKLE JOINT.

BOOMER & BOSCHERT

BALING PRESSES

ARE THE STANDARD.

Boomer & Boschert Press Co.

338 West Water St., SYRACUSE, N. Y.

HYDRAULIC.

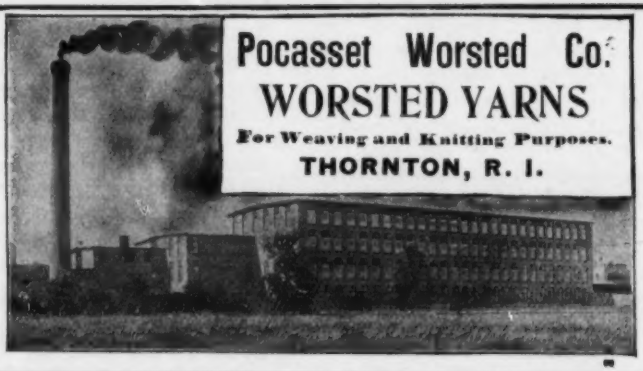
EASTON AND BURNHAM MACHINE CO.,

Pawtucket, R.I.

ALL KINDS OF Spindles USED IN THE MANUFACTURE OF COTTON, WOOL & SILK

IMPROVED UPRIGHT SPOOLERS

TO SPOOL FROM COP, SKEIN, OR BOBBIN.



Pocasset Worsted Co.

WORSTED YARNS

For Weaving and Knitting Purposes.

THORNTON, R. I.

Knitting and Weaving Yarns

Cones, Cops, Warps, Skeins,
Single, Double, Three-ply, etc.
Peeler, Egyptian, Mixed Colors.
Large Assortment.

EDWARD S. HYDE, 223 and 225 Chestnut Street, Philadelphia, Pa.

YARN DEPARTMENT.

Eastern Yarn Market.

Cotton Yarn: Spinners are well employed on all classes of yarn, and it is harder to get prompt deliveries of cotton yarn than it is to get worsted yarn. The deliveries are slow and prices are high. Cotton yarn has advanced from the first of the year about 4 to 5 cents per pound. Combed yarns have advanced from 7 to 9 cents per pound according to size. Knitters are all busy and are placing orders for the coming heavyweight season. Some of the mills will run the entire year on heavy weight garments as orders are on hand to more than enable them to do this without the light weight trade. The plush-back underwear trade is going in for wool backs with cotton face, as the cotton backs do not give the warmth, and the satisfaction necessary to hold the public trade. The combination on the fleece backs did not hold long as manufacturers seem too anxious to make sales—and undersell one another notwithstanding the low prices secured.

It is said one manufacturer stated that with a business of $600,000 per year he had only cleared his expenses; and again some manufacturers who have been more fortunate in placing orders for yarn give this advantage to the jobbers, much to the disgust of his fellow manufacturers, who say, "that if manufacturers are not to make money on this market when will they?"

The hosiery manufacturers are all busy and there are one or two new fine hosiery mills being started. The worsted weavers using cotton yarn state that it has advanced in greater proportion than has worsted yarn. It is scarce and hard to get hold of. This may all change as this condition cannot last with the great increase of cotton machinery. We note there are several independent cotton mills being erected which intend to sell yarn, and, also the knitters, many of them, rather than submit to a trust are building spinning mills. On the whole the cotton situation is very favorable to manufacturers and a good season seems before the trade.

Worsted Yarn: Spinners are all busy and are taking orders at this time only at prices which they believe the market warrants. Australian No. 2/30 is selling at $1.30 per pound, 2/40s at $1.40 per pound, with an upward tendency. The yarn syndicate which purchased the Australian yarn at $1.00 per pound must feel that after all they did not make a bad purchase. Weavers are all covering on yarn for the heavy weight season, and are making contracts with the spinners, on the highwayman's basis of "stand and deliver." There is no haggling about price. The spinner makes his price and the weaver weakly asks if it is the lowest, and then places the order without further talk. Those who have gotten in first have gotten in at the lowest, and it is all based on what Australian wool is selling for in Australia. When it was found that Australian wool brought 95 cents at the first sales the manufacturers got "scared" and bought yarn and everything else without further delay. Prices which had been steadily advancing began to advance by leaps and bounds. We know of one manufacturer who placed an order in October for 100,000 pounds of yarn at an advance over last year of 25 cents per pound. Last season he paid 92 cents for his yarn; this year the price paid was $1.15 per pound. The mill selling at $1.15 assured the manufacturer that within two weeks the price would be $1.25 per pound. Not only did this prediction prove true but today's price is $1.40 per pound. One manufacturer refused to pay 90 cents for a yarn that today he cannot buy for less than $1.10 per pound.

(Continued on page 149.)

Frank E. Patterson, Prest. Oscar W. Wood,

GERMANTOWN SPINNING COMPANY INCORPORATED GERMANTOWN JAN. 9TH 1890

Germantown Spinning Co.

COTTON CARDED

HOSIERY YARNS

In numbers from 6s to 26s.

Germantown, Philadelphia.

W. Warren Thread Works,

SPOOL COTTON

on 100 to 12,000 yd, Spools or Tubes.

A Specialty of Thread for Manufacturers Use

on Spools, Tubes or Bobbins.

Also Seaming and Hosiery Yarns

on Cones, Tubes or Skein.

Our bleaching and dyeing facilities are new and unsurpassed for prompt and neat work. Correspondence solicited.

WESTFIELD, MASS.

The Best is the Cheapest.

It is BETTER and CHEAPER to wind yarn by the "Universal" system before shipment from the mill, thus insuring perfect delivery to knitting machines without rewinding.

UNIVERSAL WINDING CO.,

F. H. BISHOP, Manager.

226 Devonshire St., - Boston, Mass.

(Continued from page 147.)

Weavers who paid 57 cents for yarn the first of the year must now pay 72 cents per pound. The buying is for all classes of yarn from Australian to ¼ blood. We know of manufacturers who have placed orders for large quantities of 2/14s who today cannot buy 50,000 pounds on account of manufacturers being sold up and on account of the wool market. Spinners are not anxious for orders and care not whether prices quoted are accepted or not.

We hear of some weavers who say they will not place further orders for yarn until after January 1st, as they say some of the buyers declare that they will not pay the excessive prices asked. Already we hear that some of the mills are getting cancellations. It may be their own fault, as sometimes weavers, on a boom market, think any old thing will answer. But however this may be some mills which thought they had orders enough to last until April now find that they must go on the market again and hustle. The importers of yarns are lamenting the fact that they let their yarns go too cheaply. Had they held on six weeks longer it would have meant 30 cents per pound more in their pockets. Yarns in Europe are on the advance and when options expire on fine yarn prices advance from 5 to 10 cents per pound. Salesmen do not like the present boom as the market is so unsettled that spinners either refuse orders or advance prices and are entirely independent of orders in any event.

Knitters of worsted underwear have more orders than they can fill and at prices which are of their own making. The instructions of salesmen handling these goods are that the manufacturer does not care whether he gets an order or not, and all orders must be at full prices. Prices just prior to the advance were so low and orders were so scarce that these mills were not running more than half their capacity.

(Continued on page 151.)

CATLIN & CO.,
YARNS.
67 Chauncy St., Boston
216 Church St., New York.
206 Chestnut St., Philadelphia.

Walcott & Campbell Spinning Co,
IROQUOIS MILLS.
FANCY HOSIERY YARNS
IN ALL COLORS.
New York Mills, Oneida Co., N. Y.

JAMES E. MITCHELL & CO.,
Commission Merchants.
122 & 124 Chestnut St., Philadelpia, Pa.
74-78 Summer St., Boston.
Cotton, Woolen & Worsted Yarns.
All numbers on Hand and Made to Order.

Cohannet Mills,
TAUNTON, MASS.
Spinners of High Grade
HOSIERY YARNS OF EVERY DESCRIPTION.
Selling Agents JAMES E. MITCHELL & CO, Philadelphia and Boston.

TUCKER & COOK MFG. CO
MANUFACTURERS OF
WHITE AND COLORED COTTON **WARPS**
Nos. 6s to 30s,
On Beams, Jack Spools or in Chain
CONWAY, MASS.

GRANT YARN CO.,
COMBED AND CARDED COTTON
YARNS 40s and above. AND
FITCHBURG, MASS. **WARPS**

E. JENCKES MFG. CO.
Colored Cotton, Hosiery, Woolen and Merino **YARNS**
PAWTUCKET, R. I.

LINEN YARN IMPORTER.
Hughes Fawcett, 115 Franklin St., New York,
Flax, Hemp & Jute Line and Tow Yarns,
FOR WEAVING PURPOSES
Linen Jacquard Harness Twines.
Fine Cotton Harness and Heddle Twines.
For Cotton, Silk, Woolen and Carpet manufacturers. Correspondence solicited. Samples promptly furnished.

CAPACITY, 50,000 Spindles.

ORSWELL MILLS

FITCHBURG MASS.

COMBED OR CARDED

COTTON YARNS

In Chains and Skeins, on Balls, Beams, Spools—single or twisted.

...CORRESPOND WITH THE...

American Moistening Company, Boston, Mass.,

And learn what their system of air moistening has accomplished. The

"DROSOPHORE" AND "VORTEX" HUMIDIFIERS

Have been most advantageously adopted by the representative mills of this country. Our system will increase your production and overcome troublesome electricity, making your carding run much better. It will reduce your waste account, and generally prove a profitable investment. With our system a perfect **Spinning** or **Weaving** atmosphere in any climate or weather is assured, and any degree of humidity is obtainable. Will cool the air in warm weather, and warm it in cold weather. **Purifies the air and makes it healthier for the work people.** Write for Booklet on Humidification.

AMERICAN MOISTENING COMPANY, 150 Devonshire Street, Boston, Mass.

Cotton Warps.

WHITTIER COTTON MILLS,
LOWELL, MASS.

YARNS

SOLIS : : BOSTON.

179 Devonshire Street.

ANDREW J. SOLIS, Jr. & CO.

INDIAN ORCHARD COMPANY,

Indian Orchard, Mass.

Manufacturers of - - - -

COTTON WARPS AND YARNS

In gray and all colors, single or in any twist.

COLORED COTTON

Machined, Carded or in Roving.

NOVELTY YARNS

In Cotton, Mercirized Cotton, Silk and Worsted, in various Patterns, Colors and Twists.
We are always pleased to assist our patrons of the Woolen Goods manufacture in special pattern warps for samples.
We use a uniform grade of long stapled cotton in all our manufacture.

(Continued from page 149.)

The worsted spinners, the early part of the year, were crazy to start a worsted yarn trust. If this had been started the spinners would today have been lamenting lost opportunities for making money. Dress goods manufacturers state that they have told all customers that unless a material advance is forthcoming they will shut down their plants, as the advance on yarn is so great that prices for dress goods must be correspondingly high.

Woolen Yarn: Spinners have been taking many orders both for future and immediate delivery. The coming season will be a very busy one for spinners of woolen yarn. Sample orders are out which will run the mills many, many times over, and the wise manufacturers are anticipating their needs and are placing orders now for deliveries in January and February. Many others will be ready to place orders in January. This applies to all branches of industry—weavers of men's wear, dress goods and knitters. Woolen spun yarn for the last two or three years has been much neglected on account of the cheapness of worsted yarn, but, with that article at its present value, manufacturers are forced to use more of the woolen yarn. It is undoubtedly a fact that many of the manufacturers will soon be without yarn, as the spinners are fast engaging their machinery for next year.

The manufacturers of knit underwear and hosiery have stopped taking orders at present prices, and will not sell until the wool market becomes more steady. This applies to manufacturers who own wool, but who will not sell out until they get full value. The manufacturers who do not own wool are in a bad condition. The advance has been so sharp that manufacturers no sooner get a line of samples out than the market advances so quickly that they are forced to make a new line and hold the samples already made. Manufacturers are also withdrawing all samples manufactured out of Australian lamb's wool.

(Continued on page 153.)

WOOLEN AND MERINO YARNS. Special line for Bicycle and Golf Goods in all shades For Hosiery, Gloves, Underwear, and all kinds Knit Goods. Cop, Cone and Skeins.

The J. & H. Clasgens Co.
New Richmond, O

Eddy & Street,
COTTON, **YARNS** WORSTED,
WOOLEN, AND SPUN SILK.
BRAIDS
PROVIDENCE, R. I.

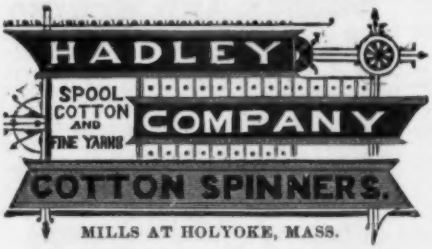
A. HERBST. J. W. JONES.
HERBST & JONES,
KENNEBEC WORSTED MILLS.
Successors to Kershaw Worsted Co.
WORSTED YARN SPINNERS,
21st & Naudain Streets,
PHILADELPHIA.

ALBERT R. ELSASSER,
Clifton Worsted Mills,
WORSTED YARNS.
Lustre Worsted a Specialty.
Mills: Addingham, Del. Co., Pa.

C. MOORE & CO.,
MANUFACTURERS OF
TWINES, THREADS AND YARNS.
Jacquard Harness Twines of all kinds on hand and made to order.
S.W. COR. FIFTH & MARKET STS.,
Philadelphia.

RICHARD CAMPION,
Selling Agent for—
Bristol Worsted Mills,
Highland Worsted Mills.
17 Bank Street, Philadelphia, Pa.

FRENCH AND BRADFORD SYSTEMS
B. F. BOYER & CO.,
WORSTED YARNS
IN WHITE AND MIXES.
Woolen and Merino Yarns
OFFICE AND MILL
Delaware and Cooper Sts.
Camden, N. J.



SPINNERS OF
FINE COTTON YARNS
30s TO 100s.
Gray, Bleached, or Colored. On cop, in skein on spools, cones or tubes.
Fine Cotton Warps, single and two-ply, in chain, etc.
Spool Cotton and Seaming Thread.
95 Milk St., BOSTON.

THE WILLIAM CLARK COMPANY,
WESTERLY, R. I.
Mills equipped with the latest and most improved machinery.
Combed Egyptian from No. 20s to 100s. Combed Sea Island from No. 40s to 200s.
Also 2, 3, 4, 5 ply and 6, 9 and 12 ply cable laid.
Hosiery Yarns on Cops Tubes or in Skeins, Grey, Bleached or Dyed. (Fast Colors.

MONUMENT MILLS,
Manufacturers of
White, Colored, Fancy and Double and Twist,
COTTON WARPS
HOUSATONIC, MASS. 4s to 60s.

GREENE & DANIELS MFG. CO.,
COMBED, CARDED AND GASSED
Yarns, Threads, Twines and Chain Warps,
Colored and Bleached Yarns Furnished in any manner desired by the trade. **PAWTUCKET, R.I.**

NEW ENGLAND THREAD CO.,
MANUFACTURERS OF
SPOOL COTTON IN NUMBERS FROM 8 to 100,
In All Grades and Lengths on Spools and Tubes.
Seaming Yarns on Cones; Polished Threads and Yarns on Bobbins.
DYEING AND BLEACHING of All Kinds of Yarns and Narrow Fabric a Specialty. Best of Spring Water for Bleaching.
PAWTUCKET, R. I.

HAYES, O. H. & CO.
Representative Lines of Woolens
O. H. HAYES & CO.
Liberal arrangements made with manufacturers or men controlling mills' productions.

(Continued from page 151.)

The market is entirely bare of anti-tariff Australian lamb's wool, which has been selling at 68 cents. The price on Australian fleece wool is $1.00 per pound with an advance of 15 to 20 per cent. expected. There has been much wool bought on speculation of late by parties representing Wall St. interests. We hear of one house at least which cleaned out all its holdings of territory wool to a syndicate of New Yorkers. It is said that Croker, the Tammany leader, is one who is in the deal. The wool house selling the wool to this syndicate is to resell the wool for them, and is to get one cent per pound for selling, with all storage expenses.

(Continued on page 147.)

Philadelphia Yarn Market.

The activity in the cotton market has continued through the past month, strengthening values in both raw stock and in yarns. The demand has been exceptionally large and while there were considerable orders to be delivered at the old price, very large renewals have been made at 3½ to 4½ cents advance.

We understand that knitters and weavers are able to get fairly satisfactory advance on new business, which is, of course, necessary in the present state of the yarn market.

Prices are about as follows, although there is a considerable difference of opinion, and difference in qualities, in the different mills. We quote:

Warps:—

20/1	16 to 16½
22/1	16½ to 17
26/1	17½ to 18

(Continued on page 155.)

WAVERLY WORSTED CO.

SPINNERS OF

WORSTED YARNS

FOR WEAVING AND KNITTING.

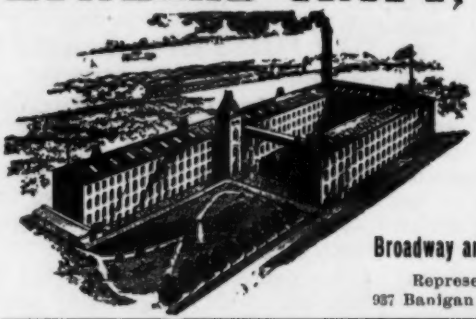
Main St. & Green Lane, Manayunk, Philadelphia.

This Space is Reserved for

ST. DENIS BLACK

(PATENTED.)

HOWLAND CROFT, SONS & CO.



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Fine Worsted Yarns

OFFICE AND MILLS:

Broadway and Jefferson Ave, Camden, N. J.

Represented by FIRTH BROADHEAD,
937 Banigan Building, Providence, R. I.

ALLEGHENY WORSTED MILLS,

Thomas Wolstenholme, Sons & Co., MANFRS. OF

ALL NUMBERS SINGLE AND TWO-PLY,

Worsted YARNS, Sell Direct,

on Cop or in Skein, for Weaving and Knitting Purposes, in White, Natural & Fancy Mixes

Office and Mills: Frankford Ave. and Westmoreland St., Phila., Pa.

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Worsted and Mohair Yarns — white or colors, in skeins, on spools, cones, or shuttle bobbins.

NOVELTY YARNS — of Mohair and Worsted. We are the only manufacturers in the United States making these yarns from the raw material to finished product and making Yarns only.

CENAPPED YARNS of all kinds. Doup Yarns. Harness Yarns. For Braids, etc.

...Dyers of Yarn and Slubbing...

BRISTOL, R. I.

George Campbell & Co.

Worsted Spinners.

Yarns, both French System and Bradford.

Knitting Yarns in all Grades and Mixes.
All Numbers to 60s.

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MANUFACTURERS OF

Novelty Yarns, Silk Noil Yarns, in Fast Colors AND White.

Mills, Frankford, Pa. Office, 229 CHESTNUT ST., PHILA.

(Continued from page 153.)

40/2	29 to 31
30/2	21 to 21½
26/2	20
20/2	18 to 18½
16/2	16½ to 17
8/3	13½

Skein:—

16/2	15½ to 16
14/2	15 to 15½
12/2	14½ to 15
8/3	13 to 13½
8/2 soft	14
10/2 "	14½
9/4 slack	13½ to 14
20/2	17½
30/2	21 to 21½
40/2	25 to 26
50/2	35 to 36
19/1 soft	16 to 16½
20/1 "	16 to 16½
14/1 "	14½ to 15
16/1 "	15½ to 16
8/1 "	14

Southern Cones (various qualities):

6s to 8s	14½ to 15
10s	15 to 15½
12s	15 to 15½
14s	15½ to 16½
16s	16 to 17
20s	17½ to 18½
22s	18 to 18½
24s	19 to 20
26s	19½ to 20
30s	21½ to 22½
40s	27 to 28

Shuttle cops:—

6s to 8s	14 to 14½
10s to 12s	14½ to 15
16s	15 to 15½
40s	20 to 22

Eastern high grade hosiery yarn:—

10s	16½ to 17
12s	17½ to 17½
14s	17½ to 18
16s	18½ to 19
20s	20
22s	20½ to 21
24s	22 to 23
26s	22½ to 23

Egyptian carded,—at value.

Combed yarns,—at value.

The demand for merino, woolen and wool spun yarns, has increased very largely. Spinners are busy at advanced prices. The market is about as follows:—

20s cut black cotton cops'	15 to 15½
12s " "	14½ to 15
16s " "	14½ to 15
26s " "	17½ to 18

SILK NOILS AND SILK NOIL YARNS
IN WHITE AND COLORS.
MOHAIR LOOPS, KNOTS, AND FANCY YARNS FOR DRESS GOODS AND CLOAKINGS.
A. T. SKERRY & CO., 47 LEONARD ST., NEW YORK.

Meyer's Silks and Threads are Strong, Even, & Free from Kinks.
They are made **Especially** for Manufacturers Use. A trial costs little and may save much. **Not in any combination.**
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87 Summer Street, - - - BOSTON

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WINDSOR LOCKS, CONN.
Manufacturers of
Mercerized Cotton Yarns. GIVES THE HIGH SILK-LIKE LUSTRE IN KNIT GOODS AND WOVEN FABRICS
Novelty Yarns. BOUCLE, BOURETTE AND SPIRALS, IN COTTON, WOOL, WORSTED, MOHAIR AND SILK.
Cotton Warps. ON BEAMS, JACK SPOOLS AND TUBES. IN FANCY TWIST COLORS AND PRINTED.

CHENEY BROTHERS,

SILK MANUFACTURERS.

ALL KINDS OF

Knitting Silks, Ribbons AND Piece Silks,

USED FOR TRIMMING KNIT GOODS.

TRAMS, ORGANZINES and SPUN SILKS, in the Hank, or on Spools or Cones, for Manufacturers' Use. Silk for Special Purposes Made to Order.

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Dyers and Finishers,

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New York Office, Silk Exchange, Broadway and Broome St.
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GLOBE DYE AND BLEACH WORKS,

FRANKFORD, - PHILADELPHIA.

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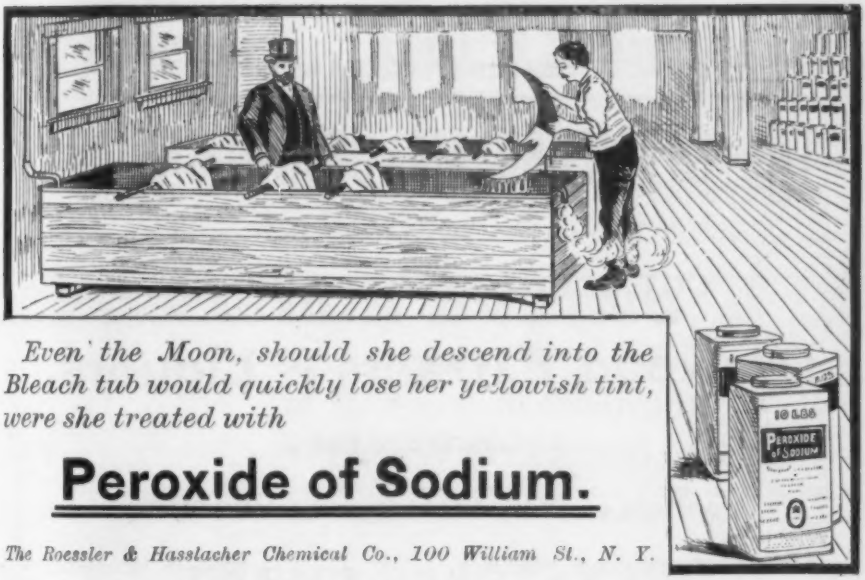

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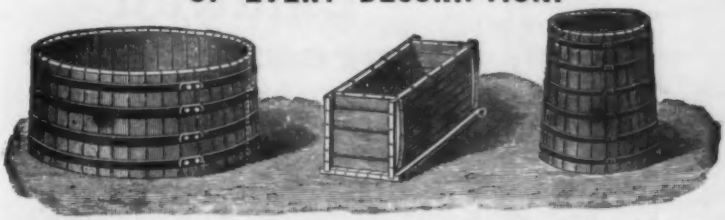

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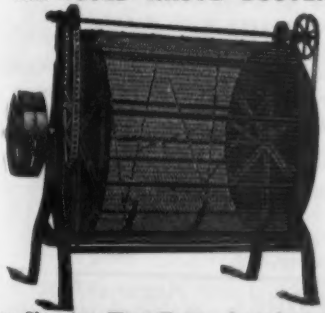

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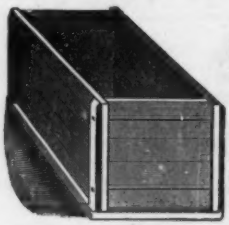

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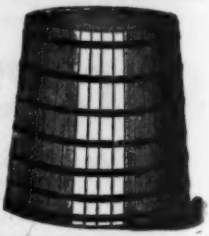

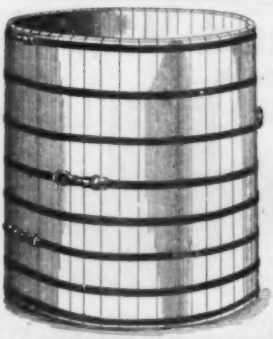

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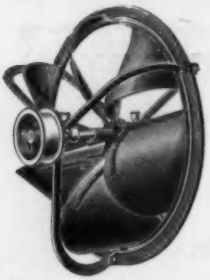

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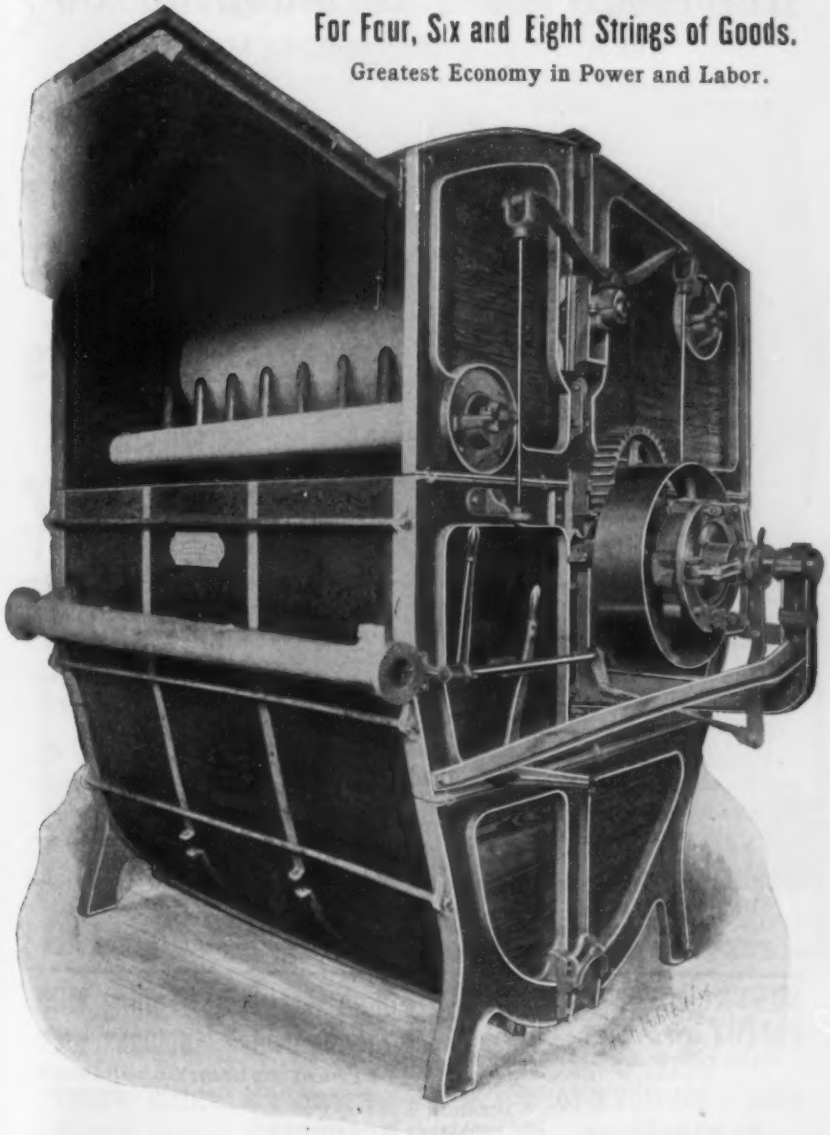

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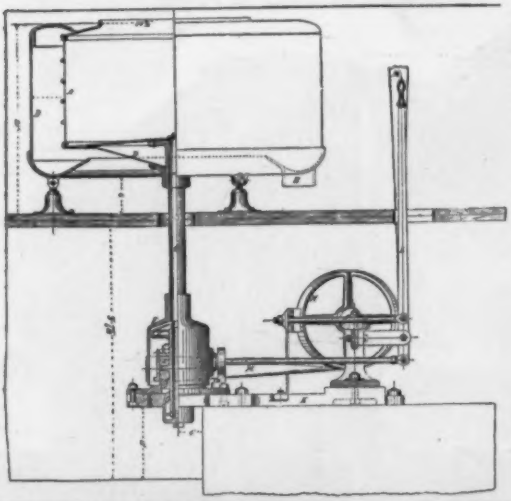

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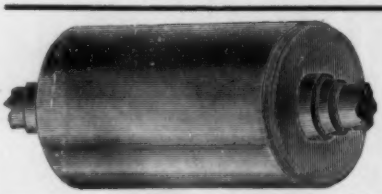

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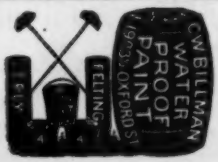

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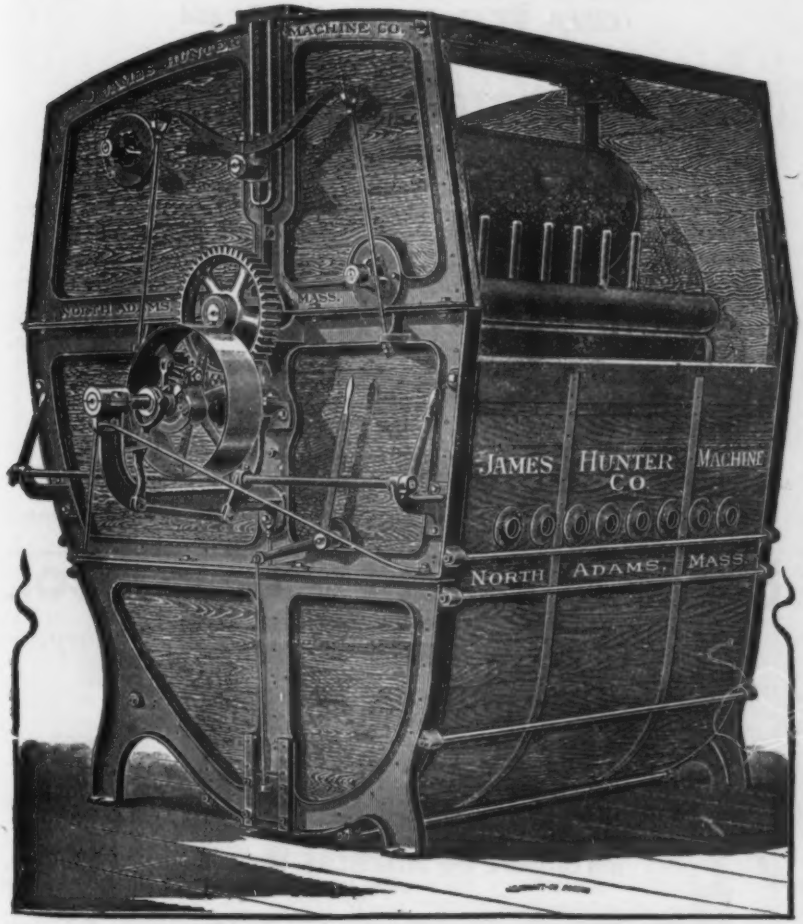

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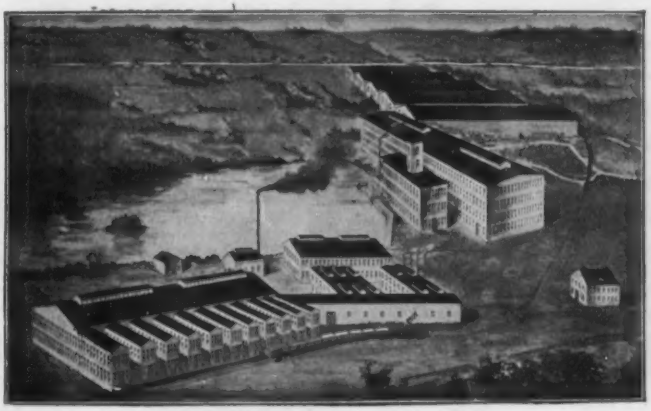

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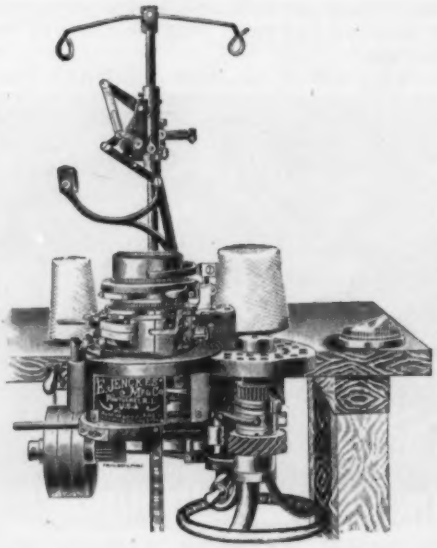

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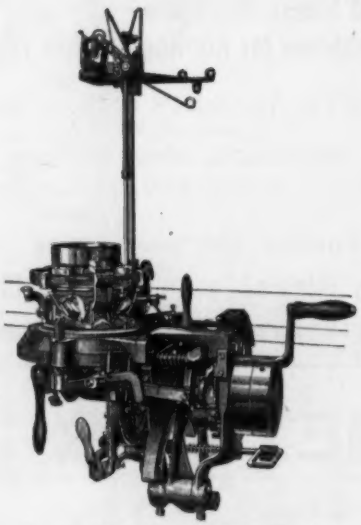

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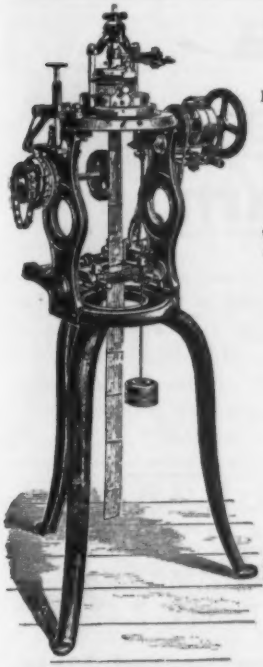

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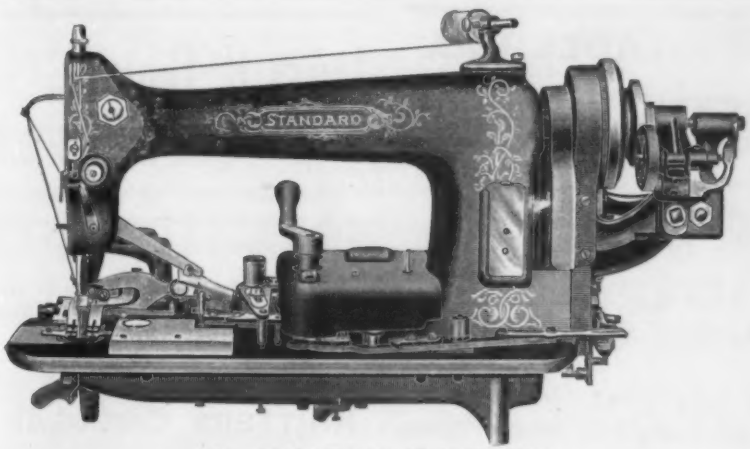

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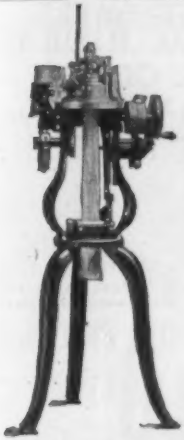

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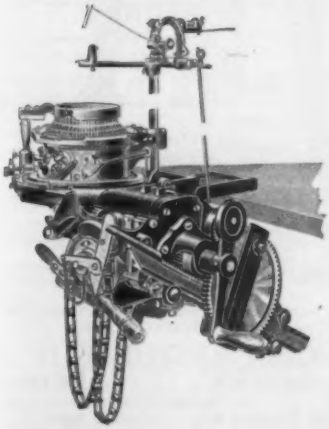

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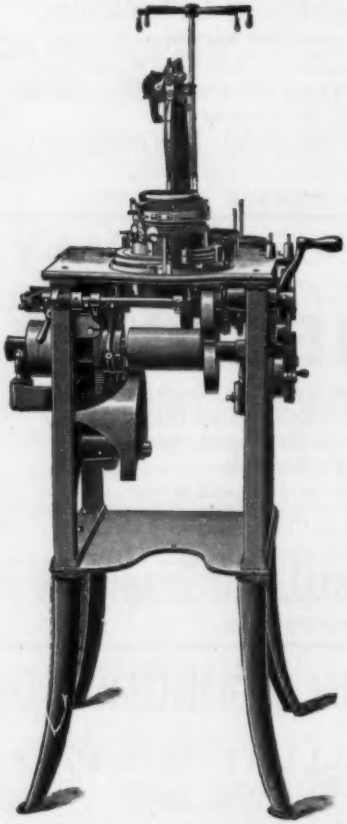

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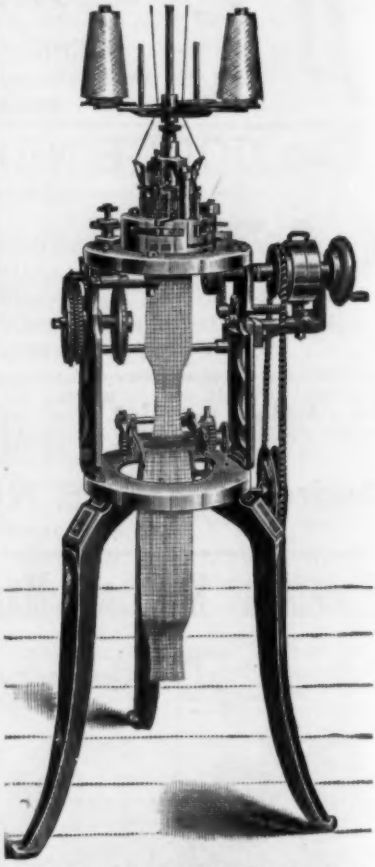

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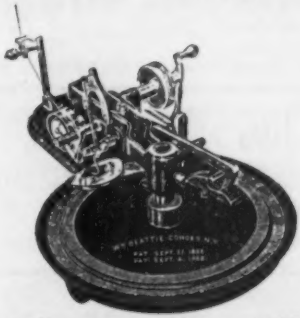

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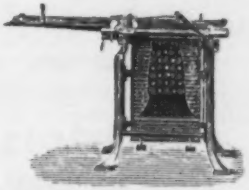

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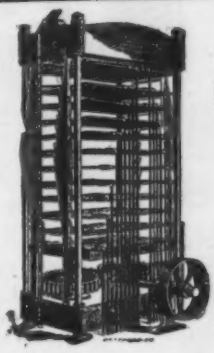

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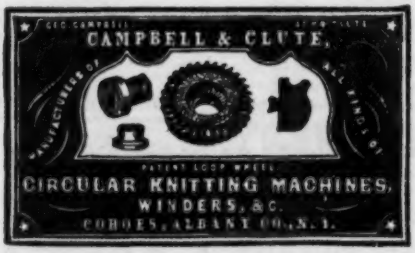

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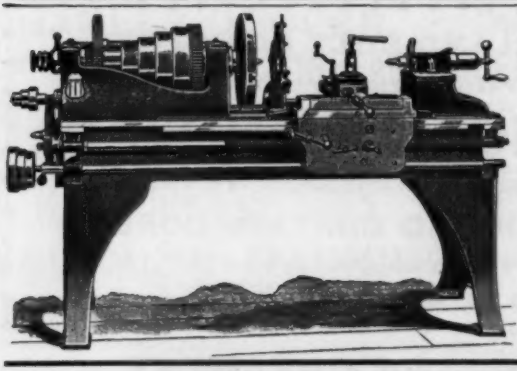

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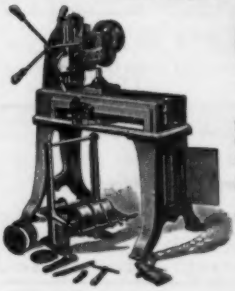

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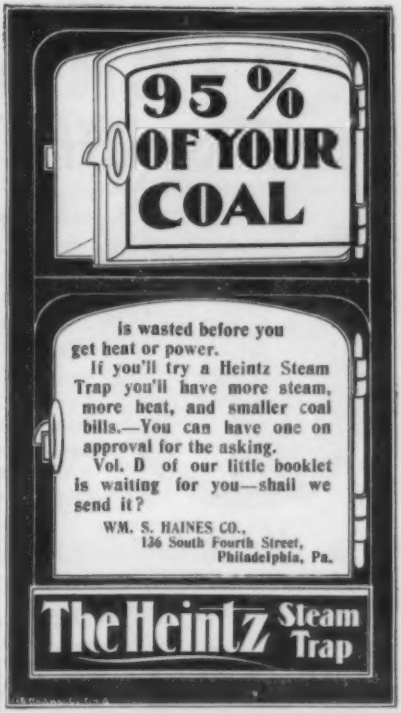
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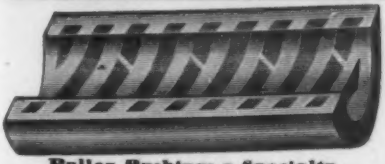

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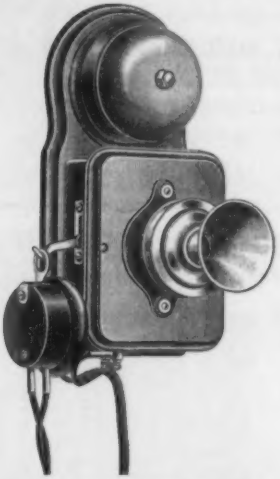

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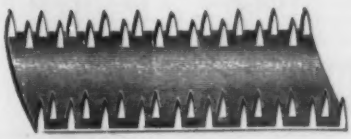

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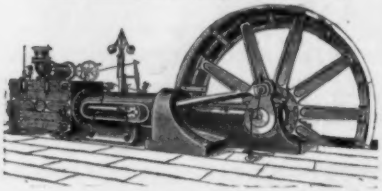

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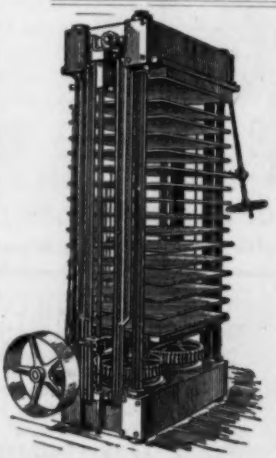

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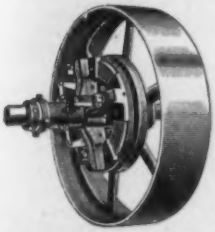

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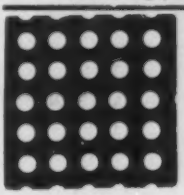

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